



**mineral resources  
& energy**

Department:  
Minerals Resources and Energy  
**REPUBLIC OF SOUTH AFRICA**

**DRAFT BASIC ASSESSMENT REPORT  
and  
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT**

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (AS AMENDED IN 2021) AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

**FILE REFERENCE NUMBER SAMRAD: GP30/5/1/1/2/10728PR**

**ISOWEL TECH SOLUTIONS (PTY) LTD**

28 October 2021

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## SPECIALIST ASSESSMENTS

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**Annexure 2**- Biodiversity Impact Assessment

**Annexure 3** – Archaeological Desktop Study

## CONSULTATION APPENDICES

**Draft BAR Consultation Appendices**

Appendix 1 - Title deed

Appendix 2 - PR Acceptance Letter

Appendix 3 - Isowel Tech Notification Letter and BID

Appendix 4- Site Notice

Appendix 5 - Site Notice Placement Pictures

Appendix 6 - Confirmation of hand delivery 10728PR

Appendix 7 - Newspaper Advert

Appendix 8 - Landowner Consent Contact List

## ACRONYMS

<b>HIA</b>	Heritage Impact Assessment
<b>ASAPA</b>	Association of Southern African Professional Archaeologists
<b>BID</b>	Background Information Document
<b>CA</b>	Competent Authority
<b>CARA</b>	Conservation of Agricultural Resources Act (Act 43 of 1983)
<b>CSA</b>	Constitution of South Africa (Act No. 108 of 1996)
<b>DEFF</b>	Department of Environment, Forestry and Fisheries
<b>DMRE</b>	Department of Mineral Resources and Energy
<b>DWS</b>	Department of Water and Sanitation
<b>EA</b>	Environmental Authorisation
<b>EAP</b>	Environmental Assessment Practitioner
<b>ECA</b>	Environment Conservation Act (ECA), 1989 (Act No. 73 of 1989)
<b>EIA</b>	Environmental Impact Assessment
<b>EIAR</b>	Environmental Impact Assessment Report
<b>GN</b>	Government Notice
<b>HIA</b>	Heritage Impact Assessment
<b>I&amp;Aps</b>	Interested and Affected Parties
<b>IEM</b>	Integrated Environmental Management
<b>IWULA</b>	Integrated Water Use License Application
<b>IWWMP</b>	Integrated Water and Waste Management Plan
<b>MPRDA</b>	Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (as amended)
<b>NEMA</b>	National Environmental Management Act (EIA regulations of April 21017)
<b>NEMAQA</b>	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
<b>NEMBA</b>	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
<b>NEMWA</b>	National Environmental Management: Waste Act (Act No. 59 of 2008)
<b>NHRA</b>	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
<b>NWA</b>	National Water Act, 1998 (Act No. 36 of 1998)
<b>OHSA</b>	Occupational Health and Safety Act (Act No. 85 of 1993)
<b>PPP</b>	Public Participation Process
<b>SAHRA</b>	South African Heritage Resources Agency
<b>SANBI</b>	South African National Biodiversity Institute

## PART A

### SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

#### 1 APPLICANT AND EAP DETAILS

##### 1.1 Details of Applicant

Applicant	<b>Isowel Tech Solutions (Pty) Ltd</b>
File Reference Number SAMRAD	GP30/5/1/1/2/10728PR
Contact Person	Tlaila Thabiso Bethuwel
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Telephone	0721453735
Fax	086 2264 397
Email	tlailamc@gmail.com/ info@isowel.co.za

##### 1.2 Details of the EAP

Company:	<b>ARCHEAN RESOURCES (PTY) LTD</b>	
Review by	Khuliso Ramulondi (Pr.Sci.Nat; REG. EAP)	
Author	Yvonne Gutoona (Cert.Sci.Nat	
EAP Qualifications	<b><u>Yvonne Gutoona</u></b> B.Sc. Geology and Geography (UZ) <b>Membership of Professional Associations:</b> Registered as a Natural Scientist (Cert.Sci.Nat.), with the South African Council for Natural Scientific Professions (SACNASP) Member of the Geological Society of South Africa SATTCA Internal Auditor Certificate in environmental management systems (ISO 14001:2004)	
CONTACT PERSON (S)	Moses Mphephu and Yvonne Gutoona	
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FAX NUMBER	0866955990	
EMAIL:	moses@archeanresources.com/roman@archeanresources.com  cc archeanresources@outlook.com	

##### 1.3 Expertise of the EAP

The EAP's experience summary of Environmental aspects below:



- Environmental Impact Assessments
- Basic assessments, WULA reports
- Water use license application
- Waste use license application
- Soil Assessment, Specialist Studies
- Prospecting and Mining right Authorizations
- Environmental Management Plans
- Public Participation
- Environmental Authorizations

## 2 PROJECT INFORMATION

### 2.1 Location of the overall Activity.

Farm Name:	Portion 9, 10, 11, 14, 23, 24, 210, 211 & 212 of Roodepoort 504 JR
Application area (Ha)	Approximately 163.849 hectares
Magisterial district:	Bronkhorstspuit, Tshwane
Distance and direction from nearest town	Approximately 4 km North of Bronkhorstspuit town
21-digit Surveyor General Code for each farm portion	T0JR00000000050400009; T0JR00000000050400010 T0JR00000000050400011; T0JR00000000050400014 T0JR00000000050400210; T0JR00000000050400211 T0JR00000000050400212; T0JR00000000050400023 T0JR00000000050400024;

### 2.2 Locality map (Show nearest town, scale not smaller than 1:250000).

Bronkhorstspuit is located roughly 2.6 km to the south of the proposed prospecting area, while Rayton is located 23 km to the west and Balmoral 26 km to the east-southeast. The demarcated farm portions fall within the City of Tshwane Metropolitan Municipality in the Gauteng Province. The R25 primary road runs northeast- southwest approximately 700 m to the east of the study area, while the R513 secondary road borders the southernmost point of the study area.



Figure 1: Nearest Towns



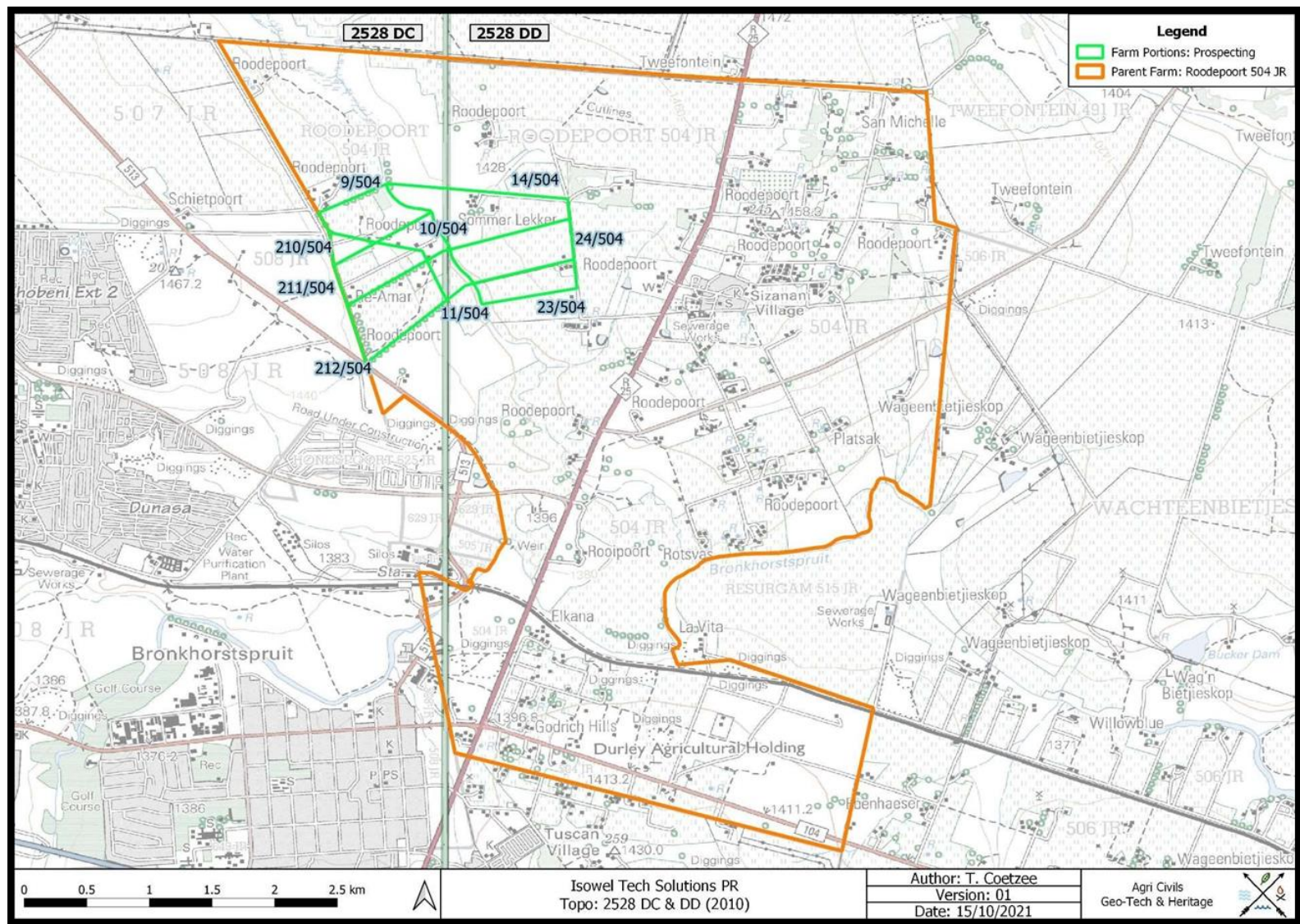


Figure 2: Locality Map



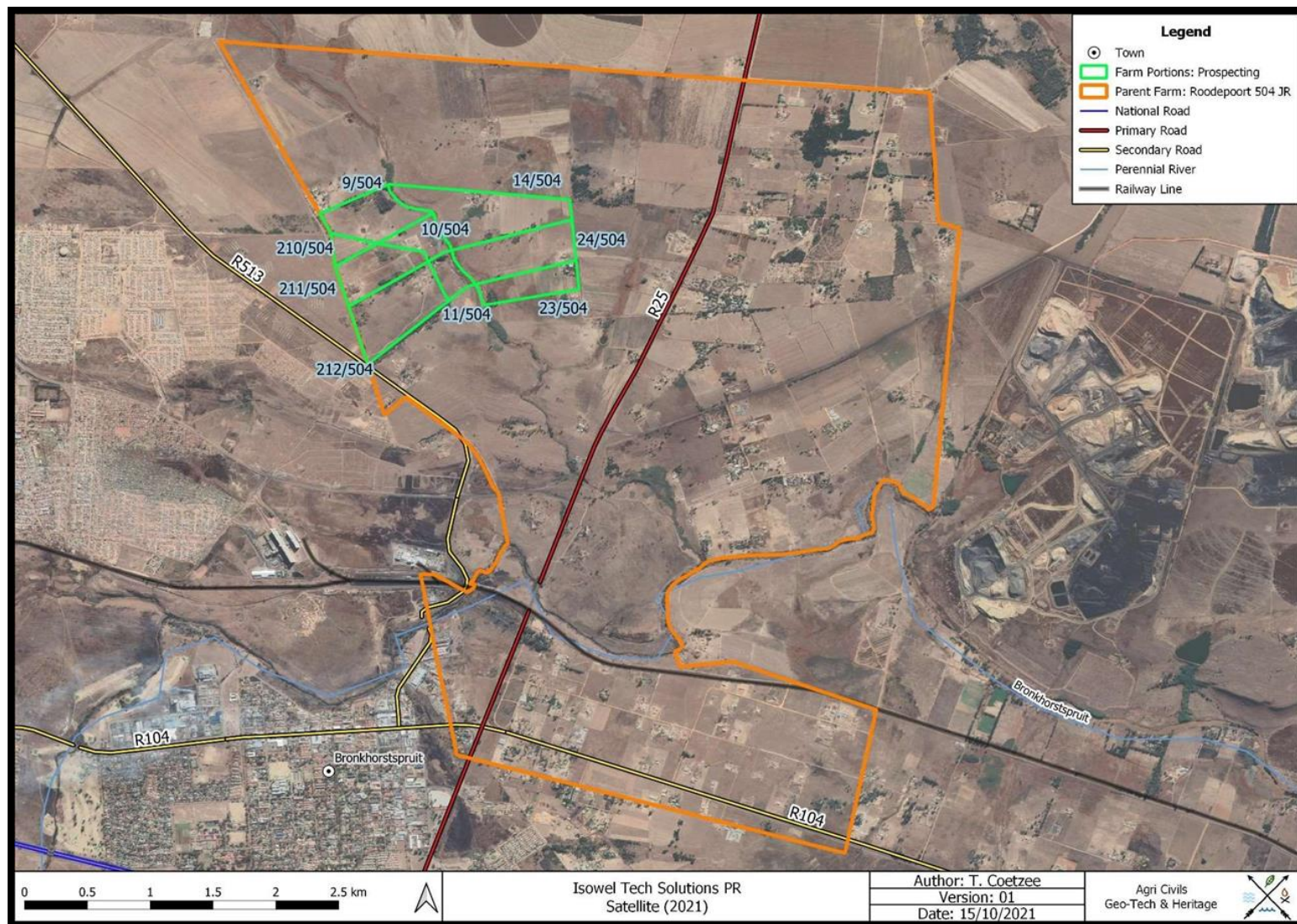


Figure 3: Site Map

### 2.3 Description of the scope of the proposed overall activity.

Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site

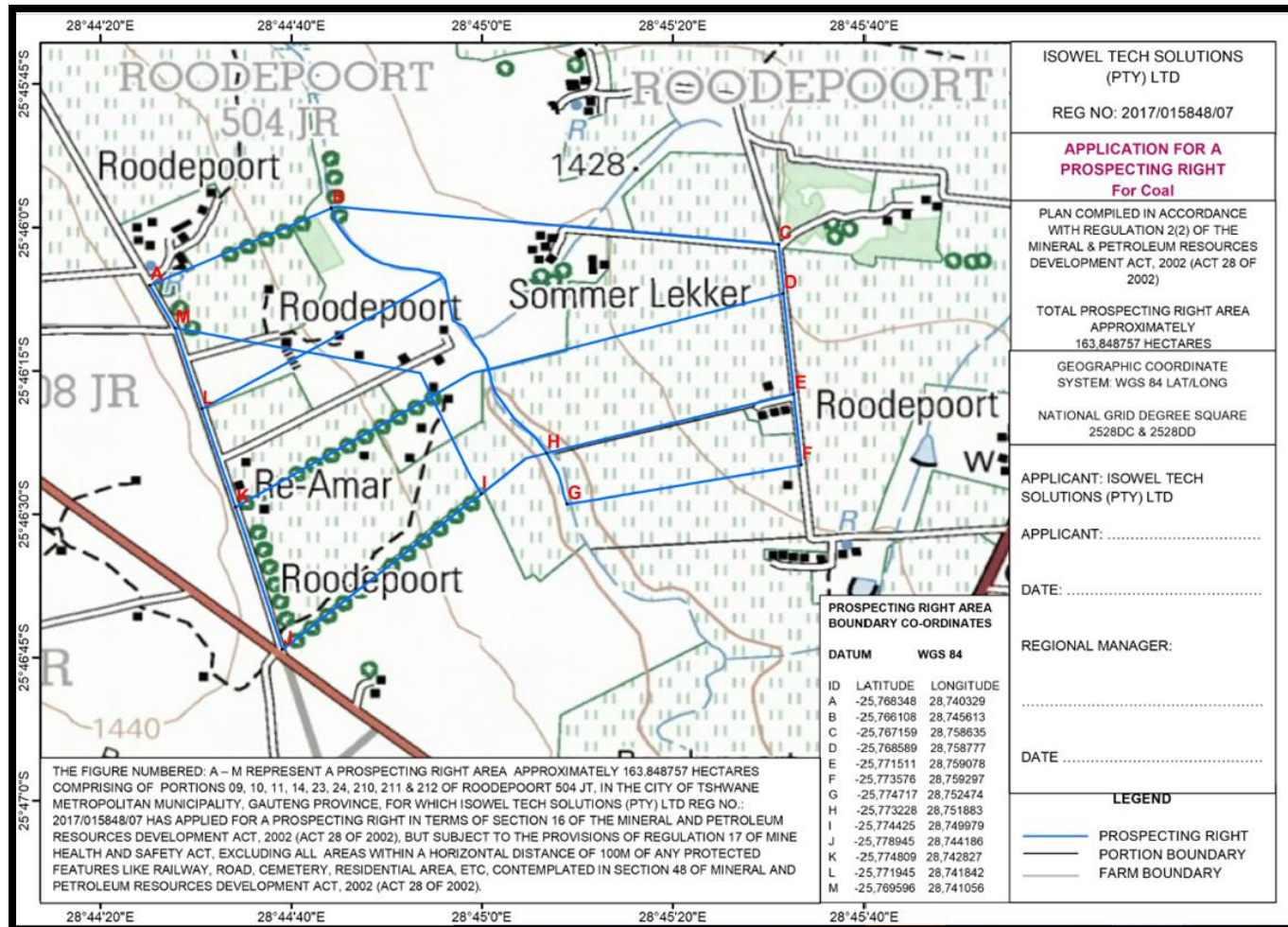


Figure 4: Regulation 2.2 Map of the Prospecting Right Application Area



### **2.3.1 Description Prospecting Activities**

#### **2.3.1.1 Non-Invasive Activities**

Consultation with landowners:

Land Tenure Specialist will visit the respective land owners prior to the proposed prospecting and arrange all issues relating to the envisaged prospecting programme such as dates, access routes, availability of water, and rehabilitation of the drill sites and any other items of mutual concern. Official permission together with all agreed requirements will be in writing.

Data processing and validation:

Data obtained during the drilling process needs to be processed and validated versus stratigraphic, structural and analytical data received and correlated with surrounding boreholes in the reserve area.

- ☐ Electronic procession of borehole data
- ☐ Validation of lithological data versus analytical data.
- ☐ Stratigraphic correlation of coal and dolerite horizons.
- ☐ Editing and correction of data on database.

Lithofacies and coal quality modelling:

Variations in a stratigraphic unit across the reserve area are generated and illustrated by contoured maps showing lateral trends of most significant properties. This is done by the utilization of computerized geological software. Detailed in situ reserve and quality determinations will then be possible through computer based modelling, and qualitative and quantitative calculations.

Compilation of geology report:

Information obtained during the exploration phase together with computer generated information is compiled into a geological report.

Inspection/Consultation with landowner:

Land Tenure Specialist will visit the boreholes during and after prospecting has been completed. Once confirmation has been obtained that the area had been properly rehabilitated, sign off will be obtained from the landowners and compensation paid for any damages caused as a result of the prospecting.

#### **2.3.1.2 Invasive Activities**

Diamond drilling:

The drill rigs are truck-mounted and equipped with diesel driven engines to provide power to the drill. A truck fitted with a water tank is used to provide the water supply for the drilling process. The drill site is not larger than 30m x 30m (900m<sup>2</sup>) and consists of a drill rig, water pump, caravan and portable chemical toilets.

Except for the sump required by the drill rig, no excavations will be required. The sumps are normally 1 m<sup>2</sup> and 50 cm (0.5 m) deep. It is always necessary to separate top soil from the subsoils. This will be given in details

on the EMPR. The dimension of the borehole is NQ ( $\pm 76$  mm) and the average depth of the coal reserve is estimated to be 100 m. On completion of the borehole, it is cemented from the bottom-up.

The only rehabilitation that will specifically be required is borehole capping and revegetation: Drill holes must be permanently capped as soon as is practicable.

#### Percussion drilling:

The drill site is not larger than 30m x 30m (900m<sup>2</sup>) and consists of a diesel-powered truck mounted drill rig, a truck transporting drill rods and other equipment, a compressor and portable chemical toilets.

Rock fragments are blown out the top of the hole and are collected at 1m depth intervals and arranged on the ground to enable continuous detailed lithological descriptions of the stratigraphic horizons to be made.

Percussion holes will either be cemented if not further utilized, or will be fitted with a cap and be used for water levels and water quality monitoring.

- Directional drilling:

The drill site is not larger than 120 m x 120 m (14400 m<sup>2</sup>) and consists of a sump, a diesel-powered drill rig, a truck transporting drill rods and other equipment, a compressor, portable offices and chemical toilet. Rock fragments are blown out the top of the hole and are sampled at 10 m depth intervals and collected in small bottles and sent to the laboratory for coal analysis. All percussion holes are sealed with cement up to the depth of start of coal.

- Geophysical down-hole surveys

The down-hole geophysical survey is done at the borehole site after the hole has been completed. A range of specialized geophysical tools are lowered into the open borehole and a range of physical lithological characteristics of the rock mass or coal are gathered and sent digitally along the cable to a computer on surface. This data is used to produce a number of profiles reflecting rock strength, coal qualities and structural features for the total length of the borehole. A single truck is used which contains all equipment including a mobile generator.

Geophysics is a subject of natural science concerned with the physical processes and physical properties of the Earth and its surrounding space environment, and the use of quantitative methods for their analysis. The term geophysics sometimes refers only to the geological applications.

- Geohydrological survey

Percussion (open-hole) boreholes may be drilled to gather geohydrological information with specific reference to aquifer yield testing and gathering of water samples for analytical purposes.

Baseline preliminary conceptual groundwater flow model to estimate inflow rates into a probable underground mining operation using hydraulic aquifer parameters obtained during aquifer yield-testing. A single truck is used which contains all equipment including a mobile generator.

### **2.3.1.3 Description Of Pre-/Feasibility Studies**

The coal seam thickness distribution, lateral extent and quality will be determined through detailed borehole measurement and laboratory core analysis. Detailed in situ reserve and quality determinations will then be possible through computer based modelling, and qualitative and quantitative calculations.

A geological report (or Competent Person Report) will be compiled which entails all results obtained during the exploration phase.

## **2.4 Description of The Activities to Be Undertaken**

The following section presents a detailed description of all the activities associated with the proposed Prospecting Application. Due to the nature of the Prospecting Works Programme, and the fact that the specific prospecting activities required are dependent on the preceding phase, assumptions are presented where required.

### **❖ Access Roads**

A number of existing roads and tracks already traverse the proposed prospecting site and where practicable, these roads will be used. During mapping activities, vehicle access will be gained to site through the existing roads.

Normal drilling practices in this region is to use existing roads and if none is available, to drive into the veld, without constructing a road, trying to miss shrubs etc. This leads to minimal damage to the area.

### **❖ Water Supply**

Water requirements for the prospecting will be sourced from nearby towns.

### **❖ Ablution**

Ablution facilities at the drill site will involve the installation of drum or tank type portable toilets.

### **❖ Accommodation**

Meals will be provided to the staff and workers as no heating and/or cold storage facilities will be available. No accommodation for staff and workers will be provided on- site and all persons will be accommodated in nearby towns. Workers will be transported to and from the prospecting site on a daily basis. Night security staff will be employed once equipment has been established onsite.

### **❖ Storage of Dangerous Goods**

No hydrocarbons (diesel) will be stored on site. Hydrocarbon spillages must be cleaned, and contaminated soil disposed of at an appropriate facility that provides a safe disposal certificate.



Table 1: Timeframes for prospecting activities

Phase	Activity	Skill(s) required	Timeframe	Outcome	Timeframe for outcome	What technical expert will sign off on the outcome?
<b>Phase 1: Invasive Prospecting</b>						
	Diamond drilling (5 boreholes)	Exploration Geologist	Month 1 (30 days)	Borehole core data Coal core samples Rock core samples	Month 1	Exploration Geologist
	Sampling	Exploration Geologist		Core analyses Rock core analyses	Month 2 – 3	Laboratory analyst
<b>Phase 1 : Non-invasive Prospecting</b>						
	Consultations with landowners	Land Tenure Specialist	Month 1	Legal Access Agreement	Month 1	Land Tenure Specialist
	Data processing and validation	Exploration Geologist	Month 7-8	Stratigraphic correct borehole data Analytical correct borehole data	Month 8 – 10 Month 8 - 10	Exploration Geologist /Database administrator Exploration Geologist /Database administrator
	Lithofacies and coal quality modelling	Exploration Geologist	Month 10-12	Contour maps Reserve breakdown	Month 10-12	Exploration Geologist /Modeller
	Inspection/Consultation with landowners	Land Tenure Specialist /Drilling contractor	Month 5-6	Rehabilitation clearance certificate	Month 5 - 6	Land Tenure Specialist / Environmental officer
<b>Phase 2 : Invasive Prospecting</b>						
	Diamond drilling (5 boreholes)	Exploration Geologist	Month 13	Borehole core data Coal core samples  Rock core samples Core analyses Rock core analyses	Month 13  Month 13-14	Exploration Geologist Laboratory analyst
	Geophysical survey (Optional)	Geophysicist Exploration Geologist	Month 13-15	Lithology data Structural data	Month 13-14	Geophysicist
	Geohydrological survey (Optional)	Geohydrologist Exploration Geologist	Month 13-14	Borehole water yield Water samples	Month 17-20	Geohydrologist
<b>Phase 2 : Non-invasive Prospecting</b>						
	Consultation with landowners	Mining Rights officer	Month 12	Legal Access Agreement	Month 12	Land Tenure Specialist

Phase	Activity	Skill(s) required	Timeframe	Outcome	Timeframe for outcome	What technical expert will sign off on the outcome?
	Data processing and validation	Exploration Geologist	Month 17-18	Stratigraphic correct borehole data Analytical correct borehole data	Month 20 – 22 Month 20 - 22	Exploration Geologist /Database administrator Exploration Geologist /Database administrator
	Lithofacies and coal/mineral grade quality modeling	Exploration Geologist	Month 22-24	Contour maps Reserve breakdown	Month 22-24	Exploration Geologist /Modeler
	Inspection/Consultation with landowners	Mining Rights officer	Month 16-17	Rehabilitation clearance certificate	Month 16 - 17	Land Tenure Specialist / Environmental officer
<b>Phase 3: In vasive Prospecting</b>						
	Diamond drilling (5 boreholes)	Exploration Geologist	Month 25	Borehole core data Coal core samples	Month 25	Exploration Geologist
				Rock core samples Coal core analyses Rock core analyses	Month 25-26	Laboratory analyst
	Directional drilling (Optional)	Exploration Geologist	Month 24-30	Lithological data	Month 24-30	Exploration Geologist
	Geophysical survey (Optional)	Geophysicist Exploration Geologist	Month 25-27	Lithology data Structural data	Month 25-26	Geophysicist
	Geohydrological survey (Optional)	Geohydrologist Exploration Geologist	Month 25-26	Borehole water yield Water samples	Month 29-30	Geohydrologist
<b>Phase 3: N on-invasive Prospecting</b>						
	Consultation with landowners	Mining Rights officer	Month 24	Legal agreement	Month 24	Land Tenure Specialist
	Data processing and validation	Exploration Geologist	Month 29-30	Stratigraphic correct borehole data Analytical correct borehole data	Month 32 – 34 Month 32 - 34	Exploration Geologist /Database administrator Exploration Geologist /Database administrator
	Lithofacies and coal/mineral quality modelling	Exploration Geologist	Month 34-36	Contour maps Reserve breakdown	Month 34-36	Exploration Geologist /Modeler
	Inspection/consultation with landowners	Land Tenure Specialist	Month 28-29	Rehabilitation clearance certificate	Month 28 - 29	Land Tenure Specialist / Environmental officer

## 2.5 Listed and specified activities

Table 2: Listed Activities

<b>NAME OF ACTIVITY</b> (E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route <b>etc...etc...etc</b>	<b>Aerial extent of the Activity</b> <b>Ha or m²</b>	<b>LISTED ACTIVITY</b> (Mark with an <b>X</b> where applicable or affected).	<b>APPLICABLE LISTING NOTICE</b> <b>(GNR 324, 325, 327)</b>	<b>WASTE MANAGEMENT AUTHORISATION</b> (Indicate whether an authorisation is required in terms of the Waste Management Act).  <b>(Mark with an X)</b>
Any activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	Extent of application area: 163.849 hectares	<b>X</b>	GNR 327 – Listing 1: Activity No. 20	N/A

## 2.6 Policy and Legislative Context

Table 3: Legislation / Policy / Guideline

<b>APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT</b> (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	<b>REFERENCE WHERE APPLIED</b>	<b>HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT.</b> (E.g. In terms of the National Water Act a Water Use License has/ has not been applied for)
Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)	The project requires a prospecting right authorisation from the Department of Mineral Resources	Prospecting right was lodged with the DMR and accepted on 20 August 2021.
NEMA Environmental Impact Assessment (EIA) Regulations, 2017 (as amended in 2020)	This Basic Assessment and Environmental Management Plan To be conducted. Baseline environmental information of the project area will be assessed. Mitigation measures and recommendations where provided according to best practice standards.	An Application for Environmental Authorisation was submitted to the DMR with the Prospecting application. The DMR Requested the submission of the Basic Assessment Report and EMP within 140 days excluding public holidays (with extension) from the date of the MPRDA acceptance.
The South African Constitution The South African Constitution (Act 108 of 1996) constitutes the supreme law of the country and guarantee the rights of all people in South Africa	Applied at potential impacts identification as well as mitigation measures and public participation	A public participation process will be followed, and consultations will be done regarding the proposed project. An EMP and awareness plan will be designed according to the issues raised during this process
National Environmental Management: Biodiversity Act, 2004	Presence of indigenous trees or extinct species	The EMP will regulate the applicant to apply for Tree Removal Permit from the Relevant authority prior to the potential removal of any sensitive and/or protected species.
National Environmental Management: Waste Act	Provisions of the waste act were consulted to determine whether a waste license was required for any aspect of the proposed development.	The project activities do not trigger a waste management license, but proper waste management measures will be addressed in the EMP.
Section 38 of the National Heritage Resources Act (Act No. 25 of 1999)	Legislation consulted during the impact assessment process, to determine what legal requirements with regards to the management of national heritage	A Heritage report has been compiled and uploaded for comment on SAHRA.

	resources were relevant to this application.	
<b>National Environmental Biodiversity Act</b> The National Environmental Management Biodiversity Act (NEM:BA), 2004 (Act No.10 of 2004), provides for: (2009) the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; (ii) the protection of species and ecosystems that warrant national protection; (iii) the sustainable use of indigenous biological resources; (iv) the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; (v) the establishment and functions of a South African National Biodiversity Institute;	Baseline review of the biodiversity.	SANBI database will be used to determine conservancy status as well as mitigation measures for alien invasive species encroaching the project area.
<b>National Water Act</b> The NWA (Act No. 36 of 1998)	The proposed activities do not require a water use license	The department has been notified of the proposed project and comments will be addressed.
National Environmental Management: Air Quality Act, 2004 (Act no.39 of 2004);	Dust monitoring on site during the operation	As part of the EMPr dust suppression methods will be used.
Mine Health and Safety Act, 1996 (Act No. 29 of 1996);	Health and Safety Policy	Risk Impact Assessment to be conducted
Gauteng Provincial Spatial Development Framework (SDF) and SDF Rural Land Use Planning & Management Guidelines (2009)	Used in the BAR to identify Need and Desirability	Guideline considered during the assessment of the need and desirability of the proposed development, at the provincial scale.
Bronkhorstspuit Municipality	Source of background demographic and socio-economic information	Utilized as a source of demographic and socio-economic information for the Kungwini Local Municipal area.
The National Environmental Management: Protected Areas Act 57 of 2003 (NEMPAA)	The application areas cover certain farm portions which are private nature reserves.	Exclusion of nature reserves from prospecting and delineation of CBA's.
Spatial Planning Land Use and Management Act, 2013 (No 16 of 2013) National Environmental Management: Waste Act, 2008; List of waste management activities promulgated in GN No. 921 of 29 November 2013 (as amended); National Waste Information Regulations promulgated in GN No. R. 625 of 13 August 2012; National Norms and Standards for the Storage of Waste promulgated in GN No. 926 of 29 November 2013; and Waste Classification and Management Regulations promulgated in GN No. R. 634 of 23 August 2013.		

### 2.6.1 Provincial legislation

In addition to national legislation such as Protected Areas Act No. 57 of 2003, National Environmental Management: Biodiversity Act No. of 2004 and Conservation of Agricultural Resources Act No. 43 of 1983, some of South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act 108 of 1996).

#### 5.2.1. Gauteng Conservation Plan 3.3 2011

A systematic conservation plan for Gauteng is the C-Plan 3 which is based on the systematic conservation protocol developed by Margules & Pressey (2000) and is based on the principles of complementarity, efficiency, defensibility and flexibility, irreplaceability, retention, persistence and accountability. Systematic conservation planning is an iterative process. Knowledge of the distribution of biodiversity, the status of species, approaches for dealing with aspects such as climate change, methods of data analysis, and the nature of threats to biodiversity within a planning region are constantly changing, especially in the Gauteng province which is developing at an extremely rapid rate. This requires that the conservation plan be treated as a living document with periodic review and updates.

The main purposes of C-Plan 3.3 are:

- to serve as the primary decision support tool for the biodiversity component of the Environmental Impact Assessment (EIA) process;
- to inform protected area expansion and biodiversity stewardship programmes in the province;
- to serve as a basis for development of Bioregional Plans in municipalities within the province.

The most important habitat categories to be taken into consideration in any environmental assessment process are:

- Critical Biodiversity Areas (CBAs): Areas that are required to meet biodiversity targets for species, ecosystems or ecological processes. These need to be kept in a natural or near-natural state, with no further loss of habitat or species. This category is split into:
  - CBA Irreplaceable Areas: These areas are required to meet biodiversity pattern and/or ecological processes targets. They are further subdivided into:
  - Irreplaceable: representing the only localities for which the conservation targets for one or more of the biodiversity features contained within can be achieved, i.e. there

are no alternative sites available; High Irreplaceable: representing areas of significantly high biodiversity value, but there are alternate sites within which the targets can be met for the biodiversity features contained within, but there aren't many;

- CBA: Irreplaceable Linkages: These are areas within Landscape Corridors that, due to modification of the natural landscape, represent the only remaining and highly constrained linkages which, if lost, would result in the breakage of the large corridor network as a whole. Their conservation is vital in maintaining the linkage of the corridor and its associated biodiversity related processes;
- CBA Optimal Areas: Areas selected to meet biodiversity pattern and/or biodiversity process targets. Alternative sites might be available to meet biodiversity targets. These areas can furthermore support suitable habitat for red and orange listed faunal and floral species;

Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) are in line with municipal Bioregional Plans. CBAs contain irreplaceable, important and protected areas (terms used in C-Plan 2) and ESAs contain buffered wetlands, buffered rivers, ridges within 1500m of CBAs, dolomite, corridors and low cost metropolitan areas (from Dr Holness).

C-Plan version 3.3 came about to properly bring C-Plan in line with municipal Bioregional Plans by reclassifying agricultural areas within CBAs rather as ESAs. Many transformed areas found since releasing C-Plan 3 were removed too. See the paragraph on C-Plan 3.3 later in this document for more information.

Important considerations in the development of the revised conservation plan, which did not exist during the production of previous versions, are the strategic support required by the protected area expansion and biodiversity stewardship programmes within GDARD, and the requirement for production of Bioregional Plans by the municipalities. These considerations influenced the technical aspects of the project in particular the identification of CBAs and ESAs as well as a public review of the technicalities of the conservation plan used to identify CBAs.

## **2.7 Need and desirability of the proposed activities.**

South African economy heavily relies on the mining sector. Successful prospecting for coal will boost the current struggling national economy as the project will advance to mining phase. The mining sector has provided more employment opportunities for the citizens in general. The Project is in line with the relevant IDP, SDF, EMF and PDP. There is no reason why this development should not be considered at this particular point in time considering the high probability of a reserve as proved by other resources in the vicinity of the area. The potential for export grade, as well as power station grade coal that is used in Eskom's Power Station for the purpose of power generation supports the proposed activities.

### **2.7.1.1 Motivation for the overall preferred site, activities and technology alternative.**

- ❖ General Geology.

Permian coal bearing formation is juxtaposed against some younger Bushveld formation. This Bushveld formation forms the overburden cover in cases.

Mainly sandstone, subordinate conglomerate, siltstone and shale of the Kransberg subgroup and medium to coarse grained sandstone, conglomerate, trachytic lava and quartz porphyry of the Swaerhoek formation, subgroup.

#### ❖ Technological and Site Activity Alternatives

Due to the nature of the proposed prospecting activities future land use alternatives will not be compromised. Once a viable reserve has been confirmed a comprehensive social and environmental impact assessment will be required (in accordance with legislation), during which time alternative land use to mining would be investigated.

In terms of the technologies proposed, these have been chosen based on the long term success of the company in terms of their prospecting history. The prospecting activities proposed in the Prospecting Works Programme is dependent on the preceding phase as previously discussed, therefore no alternatives are indicated, but rather a phased approach of trusted prospecting techniques.

The location of intrusive drilling activities will be determined during Phase 1 of the Prospecting Works Programme. All infrastructure will be temporary and/or mobile.

## **2.8 Full description of the process followed to reach the proposed preferred alternatives within the site.**

### **2.8.1 The property on which or location where it is proposed to undertake the activity;**

Bronkhorstspuit is located roughly 2.6 km to the south of the proposed prospecting area, while Rayton is located 23 km to the west and Balmoral 26 km to the east-southeast. The demarcated farm portions fall within the City of Tshwane Metropolitan Municipality in the Gauteng Province. The R25 primary road runs northeast-southwest approximately 700 m to the east of the study area, while the R513 secondary road borders the southernmost point of the study area. Prospecting is proposed on properties under application is one of the few areas where the mineralisation potential is substantiated by the geology and similar mines like Khaneil Colliery.

### **2.8.2 Minerals applied for**

Coal.

### **2.8.3 The type of activity to be undertaken;**



In terms of the technologies proposed, these have been chosen based on the long-term success of their prospecting history in this sector. The prospecting activities proposed in the PWP are depended on the preceding phase as discussed previously therefore no alternatives are indicated but rather a phased approach of trusted prospecting techniques. The proposed activity is following the minimum exploration standard to find and define a mineral resource.

#### **2.8.4 The design or layout of the activity.**

The location of activities will be determined based on the location of the prospecting activities, which will only be determined during Phase1 of the Prospecting Works Programme.

#### **2.8.5 The technology to be used in the activity.**

All equipment to be used will be provided by contractors

**Recycling:** The prospecting project will in its operational phase implement recycling policies and measures for optimal utilisation of resources and minimisation of waste generation.

**Stores and Material:** All the material to be used during drilling and sampling will be housed in the four-wheel drive vehicles.

**Electricity and Energy:** Electricity is sourced from a mobile generator. Fuel types will be investigated as well as energy conserving measures will be implemented i.e. Using solar and prospecting times will be during the day to save on using lights in the evening.

**Water:** Potable water at the project area will be sourced and transported to site by the contractor. Some of the water will be stored in water tanks next to the prospecting area and offices.

**Access Roads:** The existing access tracks on site will be used to access drilling points. No new roads will be developed without prior communication with the landowner.

**Offices:** The contractor will establish temporary mobile offices.

#### **2.8.6 The option of not implementing the activity.**

The option of not approving the activities will result in a significant loss to valuable information regarding the coal reserve status on these properties. In addition to this, should economical reserves be present, and the applicant does not have the opportunity to prospect, the opportunity to utilize these reserves for future phases will be lost. However, taking into context that successful prospecting leads to mining the current land uses are sustainable and will need to be assessed in further detail during the EIA phase of any mining right or permit application.

### 3 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

#### 3.1 Draft consultation

This section of the report provides an overview of the tasks undertaken for the PPP to date. All PPP undertaken is in accordance with the requirements of the EIA Regulations (2021 as amended). It further provides an outline of the next steps in the PPP and makes recommendations for tasks to be undertaken during the environmental assessment phase of the environmental authorisation process.

The PPP tasks conducted for the proposed project to date include:

1. Identification of key Interested and Affected Parties (affected and adjacent landowners) and other stakeholders (organs of state and other parties);
2. Formal notification of the application to key Interested and Affected Parties (all adjacent landowners) and other stakeholders;
3. Consultation and correspondence with I&AP's and Stakeholders and the addressing of their comments; and
4. Newspaper adverts.

##### 3.1.1 Landowners and landowner consent

Landowners were identified through a search conducted via online search engines accessing the Title Deed office database. In addition to landowners, other relevant organisations were identified and notified of the application. This includes municipal and State departments with jurisdiction in the area and Non-governmental Organisations (NGOs) with an interest.

Owner Name and surname	Farm Name and farm Number
NATIONAL GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA	Rooderpoort 504 JR Portion 9
JANKER BOERDERY CC	Rooderpoort 504 JR Portion 10
MEYERS SAM JOSIAH	Rooderpoort 504 JR Portion 11 and 212
I & J BOERDERY CC	Rooderpoort 504 JR Portion 14
VISSER CATHARINA MARIA	Rooderpoort 504 JR Portion 23
MASHABELA KGOBORO GILBERT	Rooderpoort 504 JR Portion 24
PELSER DANIEL ELARDUS LODIEWIKUS	Rooderpoort 504 JR Portion 210
CITY OF TSHWANE (Pilusi)	Rooderpoort 504 JR Portion 211

Consent forms have been circulated among the landowners and no objections have been received regarding the prospecting right application and environmental authorisation application as required from June 2021.

#### 3.2 I&AP and Stakeholder identification, registration and the creation of an electronic database

Public Participation is the involvement of all parties who are either potentially interested and or affected by the proposed development. The principle objective of public participation is to inform and enrich decision-making. This is also its key role in this Environmental Impact Assessment (EIA) process.

Interested and Affected parties (I&APs) representing the following sectors of society have been identified:

- National, provincial and local government.
- Agriculture, including local landowners.
- Community Based Organisations.
- Non-Governmental Organisations.
- Water bodies.
- Tourism.
- Industry and mining.
- Commerce;
- Standfontein and Doorspring HOA and
- Other stakeholders.

### **3.3 Formal notification of the application to key Interested and Affected Parties (adjacent landowners) and other stakeholders**

The project was announced as follows:

#### **3.3.1 Newspaper advertisement**

An advertisement in English was published on the 29<sup>th</sup> of November 2021 in the Streeknuus/news local newspaper announcing the project, availability of the Basic Assessment report, requesting interested and affected parties to register, and the change of the reference number.

#### **3.3.2 Site notice placement**

In order to inform surrounding communities and adjacent landowners of the proposed development, site notices need to be erected on site and at visible locations close to the site. Site Notices were placed in the vicinity of the project, at the Local Municipality, Post Office, Farms, and library on 28<sup>th</sup> and 29<sup>th</sup> of October 2021.

#### **3.3.3 Written notification**

I&AP's and other key stakeholders were notified via email and hard copy submission of the Basic Assessment report with specialist studies and consultation conducted to date. Documents were emailed and made available from the 29<sup>th</sup> of October 2021.

#### **3.3.4 Background Information Document**

A Background Information Document (BID) was distributed (by email and hand) to landowners, community and interested parties on the 28<sup>th</sup> and 29<sup>th</sup> of October 2021. The BID provides information concerning the proposed project and invited IAPs to register. IAPs were welcome to distribute the documents to other parties who may be interested or affected by the project.

#### **3.3.5 Public Meeting**

Public meeting will be held on the 23rd of November 2021 at Bronkhorstspuit Hall, C/o Market and Louis Botha Ave Bronkhorstspuit 1020. 10h00am.

### **3.3.6 Consultation and correspondence with I&AP's and Stakeholders and the addressing of their comments (continuous).**

All comments and responses received and pending from commenting authorities will included in the comments and responses report of the BAR, which will be submitted to the Department of Mineral Resources.

### **3.3.7 Release of the Draft Report to I&AP's and stakeholders for review and comment.**

Basic Assessment Report/ Environmental Management Plan will be available for review for at least 30 days from the 29th of October to the 29th of November 2021; Reports will be emailed to registered interested and affected parties and upon request, hard copies will be available at:

- Bronkhorspruit Community Library
- Zithobeni Library and
- Kungwini Local Municipality

Additional electronic and or hard copies were available to interested and affected parties and stakeholders who requested them.

### **3.3.8 Next Phases of the Public Participation Process**

All comments and responses received and sent throughout the entire process will be updated and included in the comments and responses report which will be an addendum of the BAR. The C&R will be submitted to the DMR and I&AP's.

### **3.3.9 Consultation Appendices**

#### **DRAFT CONSULTATION APPENDICES**

Appendix 1 - Title deed

Appendix 2 - PR Acceptance Letter

Appendix 3 - Isowel Tech Notification Letter and BID

Appendix 4- Site Notice

Appendix 5 - Site Notice Placement Pictures

Appendix 6 - Confirmation of hand delivery 10728PR

## 4 BASELINE ENVIRONMENT

### 4.1 Type of environment affected by the proposed activity.

Region 7 is an extensive rural region with a low population density, high unemployment and close to a quarter of the dwelling un-informal. The region includes the areas of Bronkhorstspuit, Ekangala, Ekandustria, low income residential areas and surrounding rural areas. The urban area of Bronkhorstspuit is more developed, with modern infrastructure, such as water, electricity, roads, communication network

The area contains some of the best farming land in Gauteng. The area has a rather weak spatial structure characterised by heavy through traffic, vast open spaces, and small economic centres. The map below shows the location of Region 7 in the City of Tshwane.

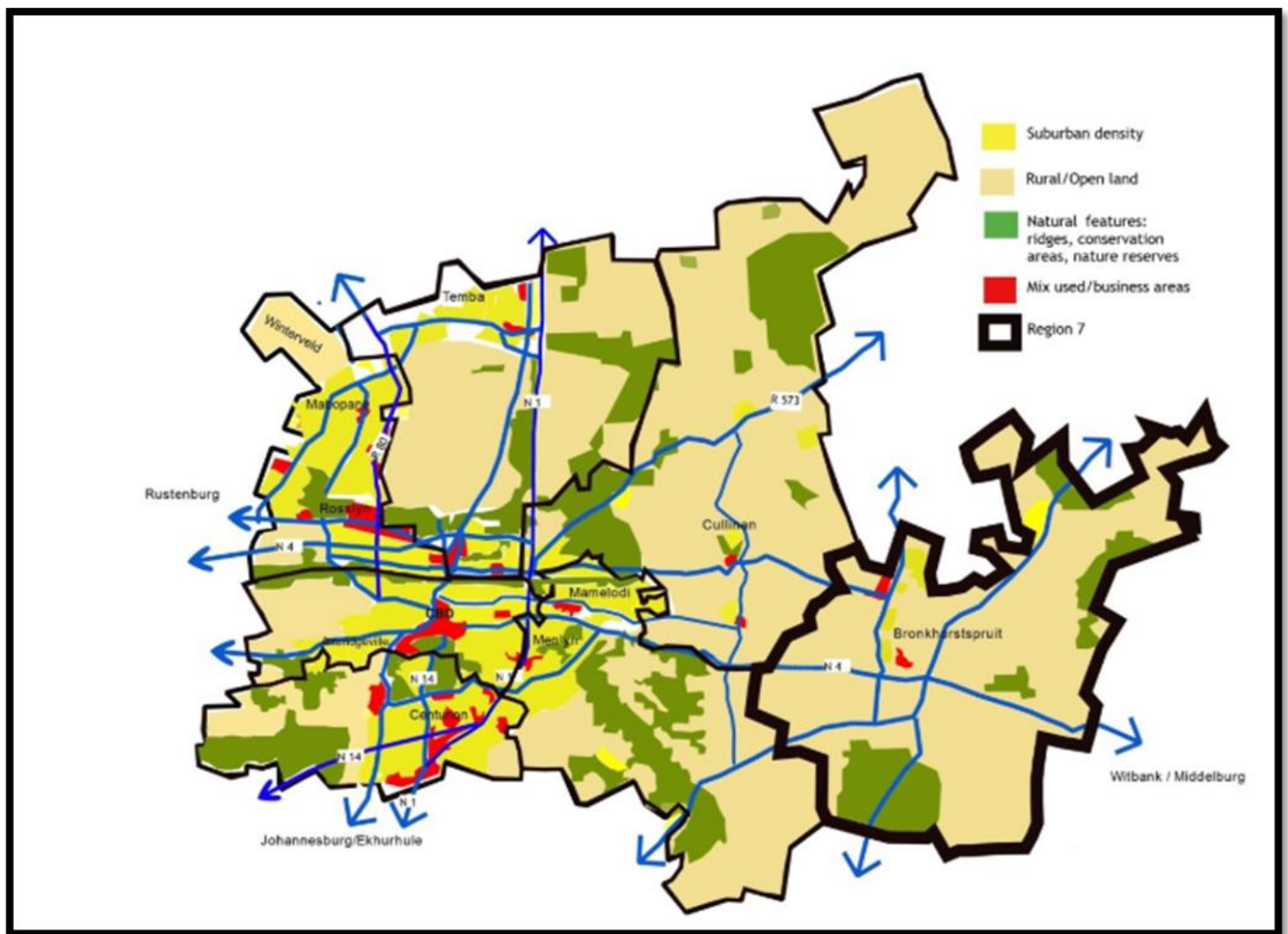


Figure 5: Municipal Location

#### 4.1.1 Topography and Geography

The average elevation for Rand Highveld Grassland varies between 1300 and 1635 metres above sea level (MASL) while the average elevation of the study area is 1410 MASL and slopes from the eastern and western borders to the lower mid-section where a non-perennial stream is found.

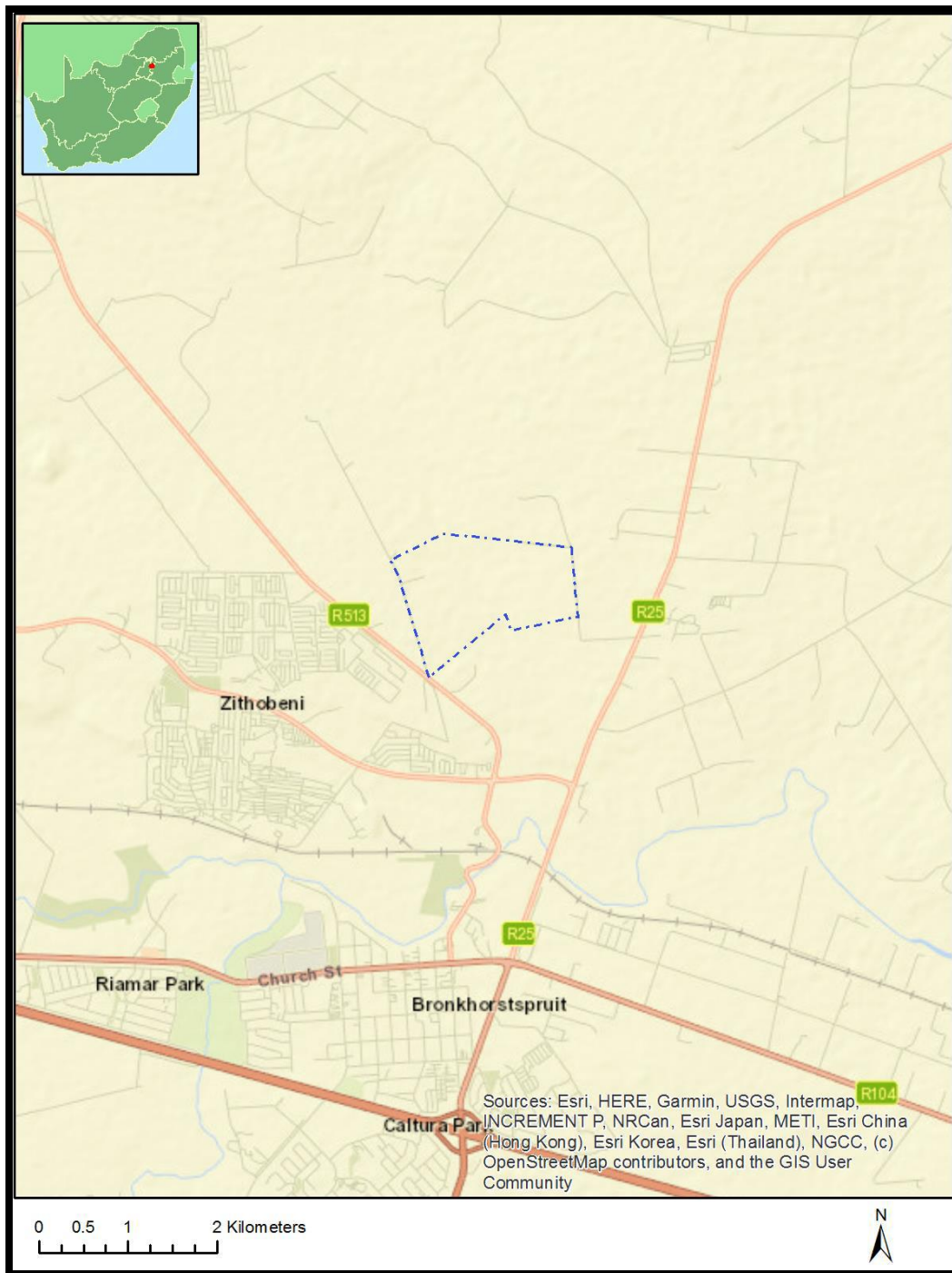


Figure 6: Terrain

#### **4.1.2 Climate**

The study area falls within the summer rainfall region and the average annual rainfall is roughly 677 mm. The average maximum temperature for the study area is recorded during January when an average of 21.3 °C is reached. The average minimum temperature is recorded during June when an average of 10 °C is reached (Climate-data.org 14/10/2021).

#### **4.1.3 Air Quality**

The air quality of the study area is mostly influenced by activities from mining operations, farming activities, domestic fires, vehicle exhaust emissions and dust entrained by vehicles. These emission sources vary from activities that generate relatively coarse airborne particulates (such as farmland preparation, dust from paved and unpaved roads) to fine PM such as that emitted by vehicle exhausts, diesel power generators and dryers.

Emissions from unpaved roads constitute a major source of emissions to the atmosphere in South Africa. Dust emissions from unpaved roads are a function of vehicle traffic and the silt loading on the roads. Emissions generated by wind erosion are dependent on the frequency of disturbance of the erodible surface. Every time that a surface is disturbed e.g. by mining, agriculture and/or grazing activities, its erosion potential is restored.

#### **4.1.4 Hydrology**

Groundwater occurrence in the area favours weathered shale, brecciated or jointed zones and especially the contact zone between intrusive diabase sills and the shale. The groundwater yield potential is classed as good on the basis that 40% of the boreholes on record produce in excess of 2 L/s and 22% produce more than 5 L/s. Higher yielding boreholes occur more often in association with the surface water drainage systems of the broad valley bottoms. The groundwater rest level occurs between 10 and 25 m below surface, although depths of up to 80 m occur at the foot of the Magaliesburg Range

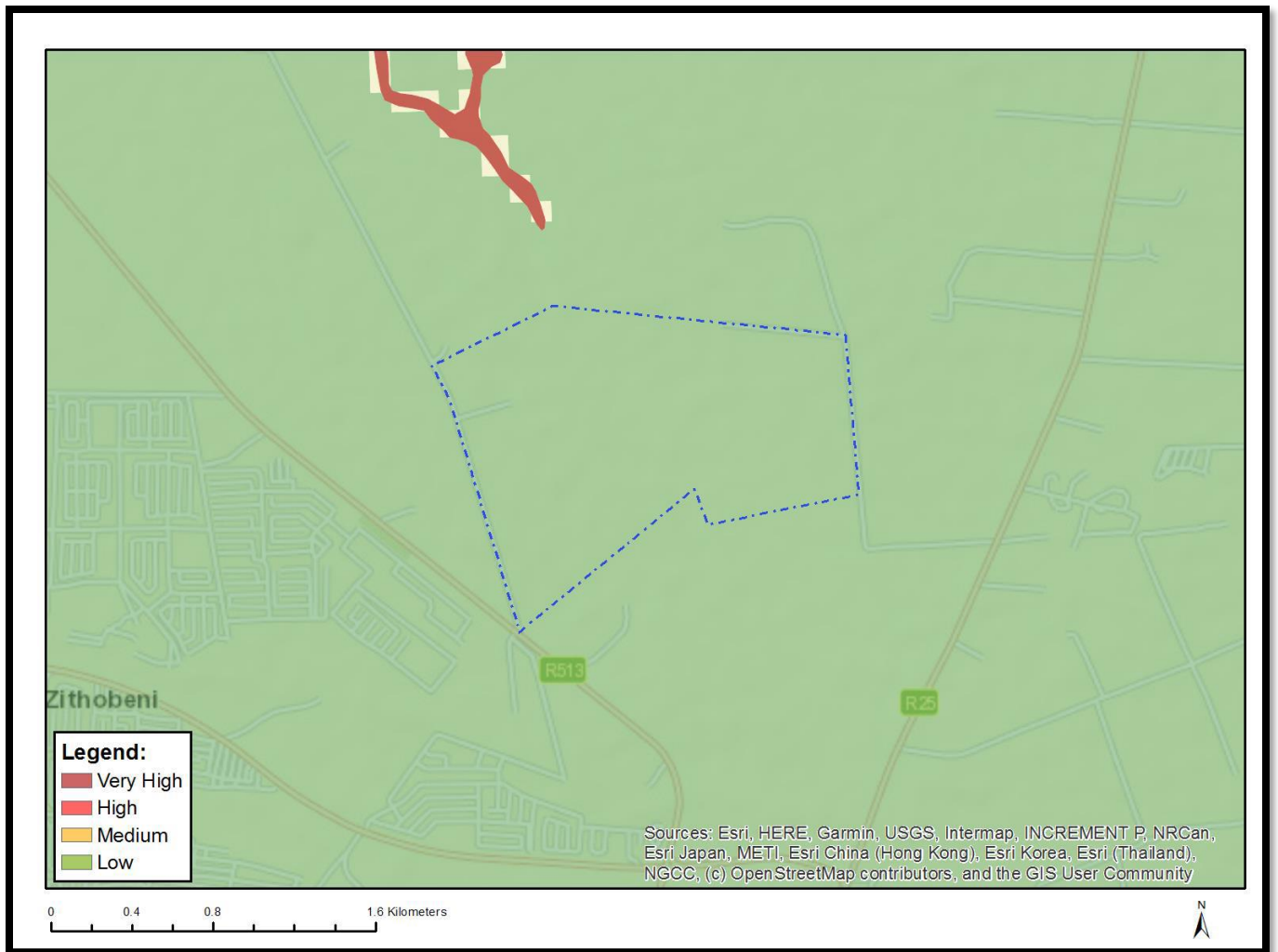


Figure 7: Map of Relative Aquatic Biodiversity Theme Sensitivity

#### 4.1.4.1 Drainage network

The study area falls within the B20D Quaternary Catchment within the Olifants Water Management Area. The closest perennial river to the study area is the Bronkhorstspuit River that flows approximately 2 km to the south of the proposed Isowel Tech Solutions (Pty) Ltd Prospecting Project. A non-perennial offshoot divides the study area into an eastern and western half.



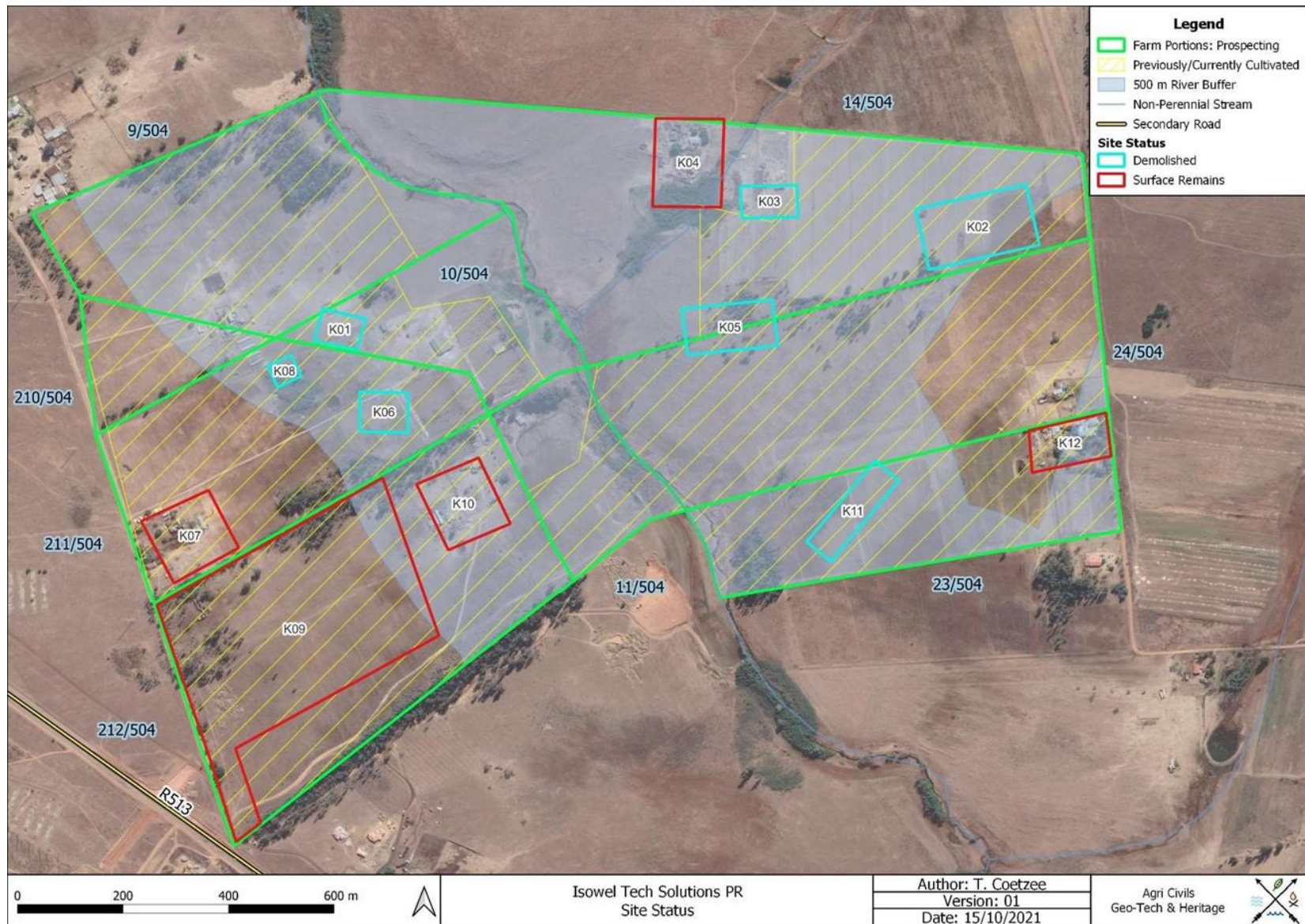


Figure 8: Drainage map showing the site in relation to the quaternary catchments

The map above shows a drainage line traversing the prospecting area and wetlands and buffers in the vicinity of the application area.



Figure 9: Wetland on portion 14



Figure 10: River on portion 9



#### 4.1.5 Geohydrology

##### 4.1.5.1 Groundwater Quality

The regional groundwater quality varies greatly with the associated geologies of the area, and ranges from good to very poor. The groundwater electrical conductivity (EC) associated with the project area, as provided by DWAF (2000), ranges from 70 to 1000 mS/m. There are no existing groundwater contaminants thought to be present in the study area, as the land is not utilised for any activities that interact with the subsurface (i.e. groundwater users, agricultural activities and large infrastructure).



Portion 9

Portion 211

Figure 11: Boreholes on site

#### 4.1.6 Geology

Permian coal bearing formation is juxtaposed against some younger Bushveld formation. This Bushveld formation forms the overburden cover in cases. Mainly sandstone, subordinate conglomerate, siltstone and shale of the kranberg subgroup and medium to coarse grained sandstone, conglomerate, trachytic lava and quartz porphyry of the swaerhoek formation, subgroup. The farm is completely covered by coal forming lithology of wilgerivier formation and includes coal beds, sandstone, quartzitic and conglomerate (Crysol,2021). The potential seam

includes seam Two, which varies in thickness from 6m to 12m. Below Seam Two is a well-developed Seam One, which is from 2.3m to 3.5m thick. On top we can expect pitching of Seam Three. The expected grade includes CV: 25.5-25.8 Mj/kg | Ash: 17-18% | Volatile Content: 18.5-19% | Fixed Carbon: 60.5-61% | Total Sulphur: 0.5-0.6% | Inherent Moisture: 2.6-2.9% (Crysol,2021).

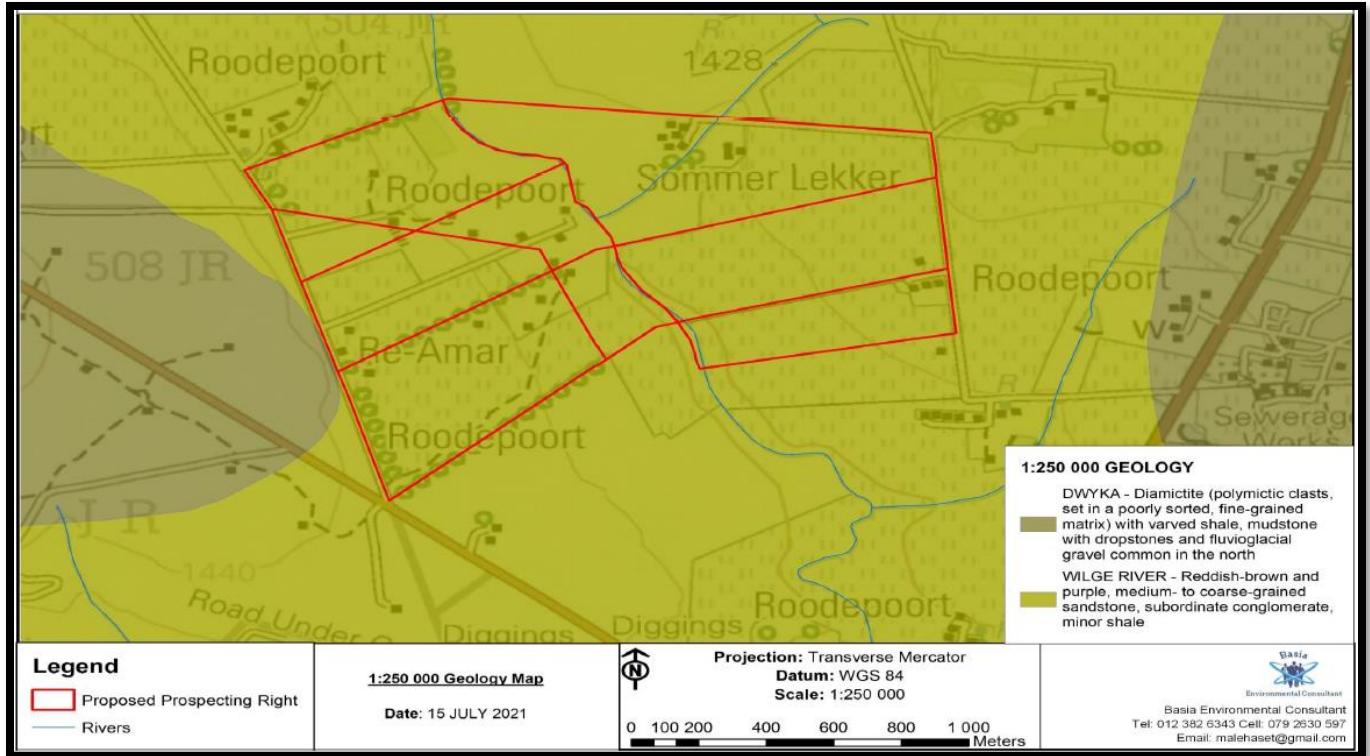


Figure 12: Simplified Geology Map

#### 4.1.7 Land Capability

The soil profile for the area of the proposed development reflects the underlying geology and consists of a thin growing medium or topsoil which is underlain by a nodular or hardpan ferricrete transition zone or pebble marker. The soils in the area are generally of a high quality and subsequently the land is zoned for agriculture. The residual soils of the diabase dykes comprise yellowish brown clayey silt, while the Silverton shales have been slightly decomposed to soft rock. Both the shales and diabase are fine-grained and as such are of low permeability, except where sections of decomposed bedrock are fissured or slightly jointed.





Figure 13:GDARD Poultry farming



Figure 14: Farming activities on site

The significance of the agricultural impact of the prospecting phase is likely to be very low. This is because the impact will be very temporary, widely dispersed, with a very small footprint of impact, and even within that small

footprint, will create minimal disturbance to the soil and vegetation, and therefore to the agricultural potential. Because of the low impact, mitigation measures for prospecting impacts on agricultural resources will be minor.

The mining phase will obviously have a much greater agricultural impact. It will also have a significant soil impact, which will be important, even where the agriculture value of the land is low, because the soil will still require effective rehabilitation for the ecological function of supporting natural vegetation cover.

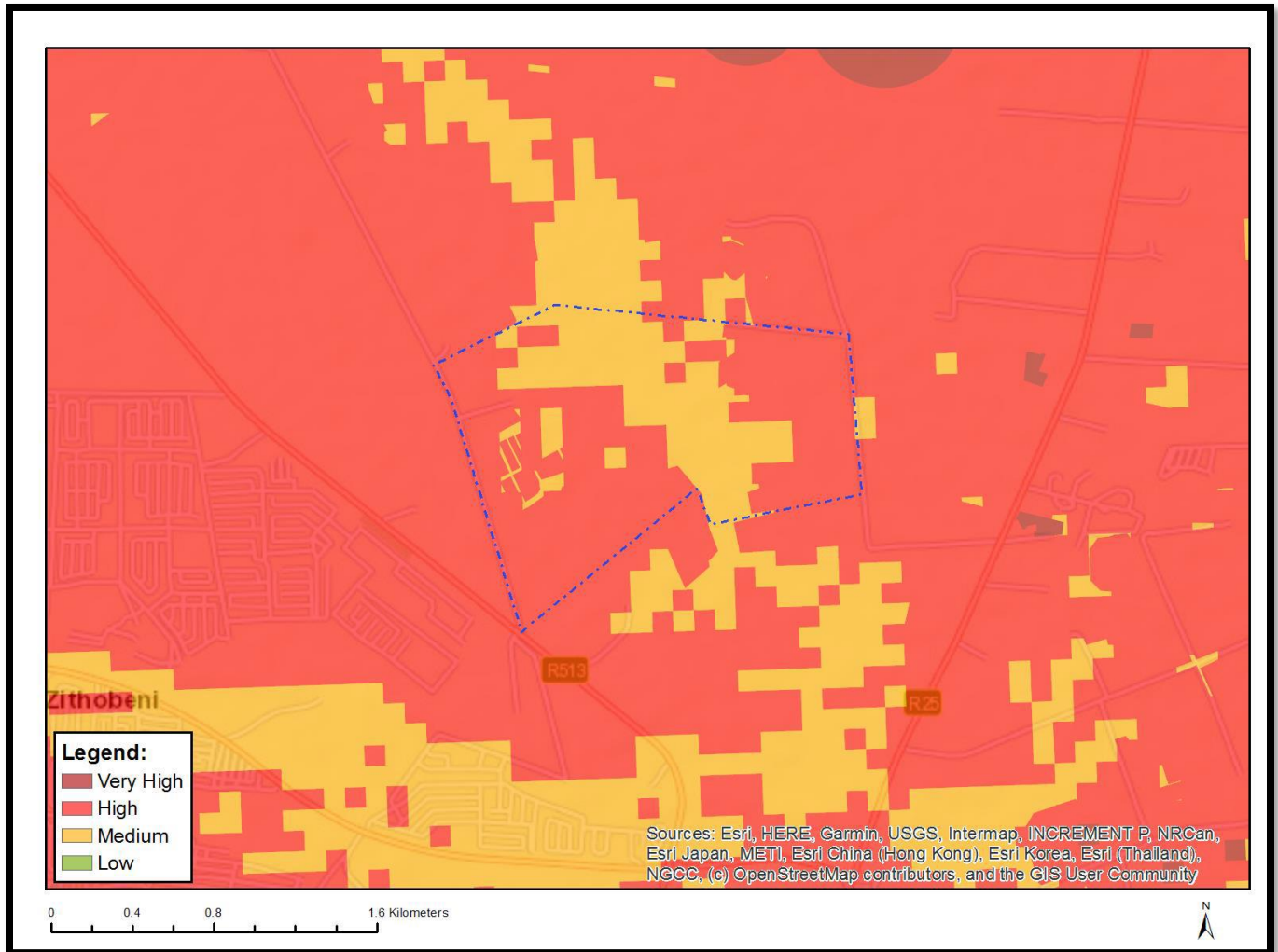


Figure 15: Map of Relative Agriculture Theme Sensitivity

#### 4.1.8 Vegetation of the study site

The vegetation units of Mucina and Rutherford (2006) were used as references but where necessary communities are named according to the recommendations of a standardized South African Syntaxonomic nomenclature system. By combining the available literature with the survey results, stratification of vegetation communities was possible.

Selected sites within the area were also searched for important species and the potential for Red Data Listed (RDL) and other important species were established, and cross referenced with New Plants of South Africa (POSA) database. The aim was to identify distinct vegetation types and to establish their integrity and representation in the study area. The veld types are described on a local level. The study site is covered, predominantly by graminoids and woody species (mostly alien), with few shrubs. This type of vegetation has the potential to support a variety of faunal species including birds, but due to farming and human settlements, very few animals remain.

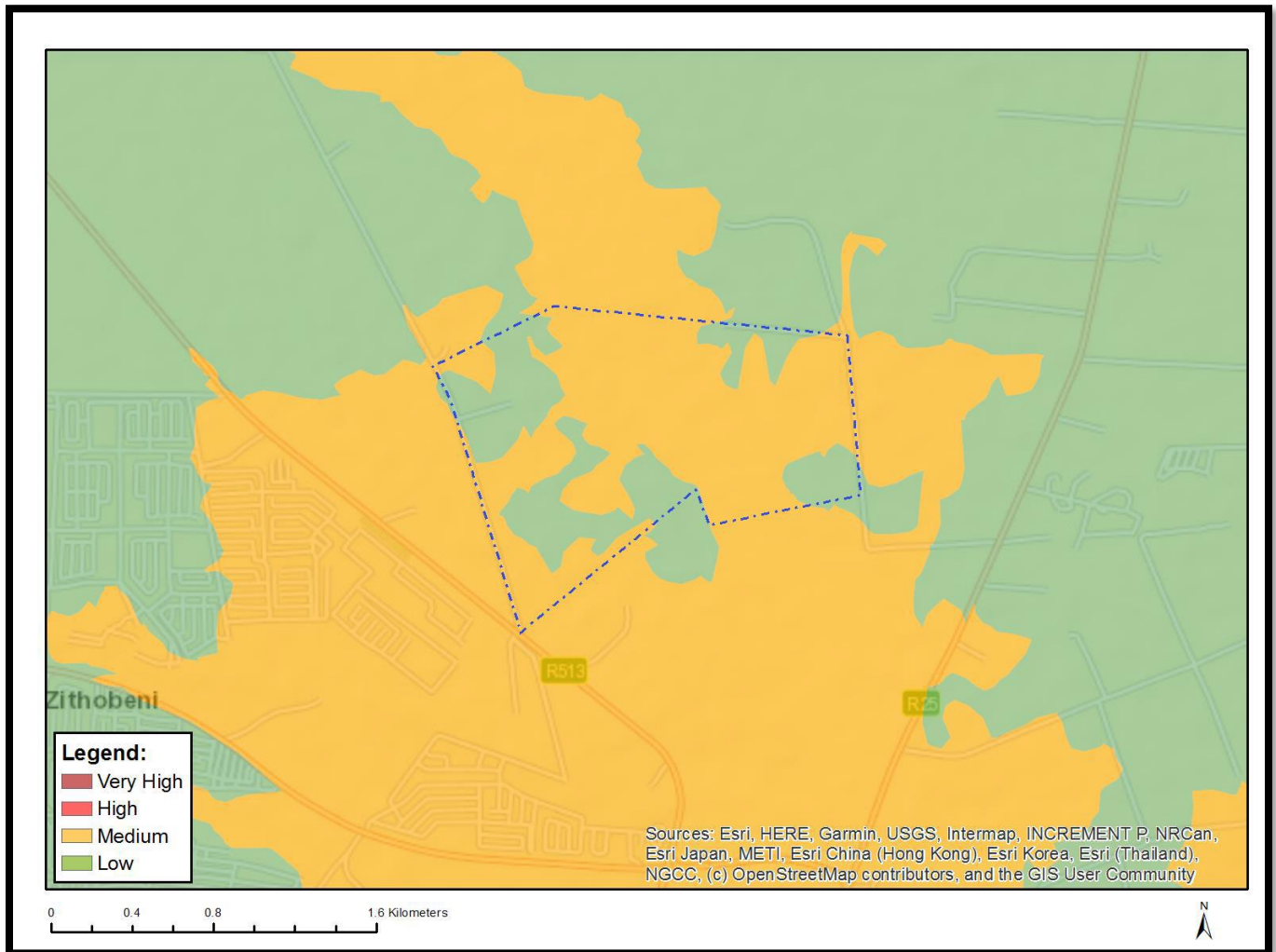


Figure 16: Map of Relative Plant Species Theme Sensitivity

#### 4.1.8.1 Vegetation types and biophysical descriptions

Vegetation units are broadly classed and may include several distinct vegetation communities within a unit. Vegetation type found within the study site is Rand Highveld Grassland.



#### 4.1.8.1.1 Distribution

This vegetation type is found in Gauteng, North-West, Free State and Mpumalanga Provinces: In areas between rocky ridges from Pretoria to Witbank, extending onto ridges in the Stoffberg and Roossenekal regions as well as west of Krugersdorp centred in the vicinity of Derby and Potchefstroom, extending southwards and northeastwards from there.

#### 4.1.8.2 Vegetation & Landscape Features

Highly variable landscape with extensive sloping plains and a series of ridges slightly elevated over undulating surrounding plains. The vegetation is species-rich, wiry, sour grassland alternating with low, sour shrubland on rocky outcrops and steeper slopes. Most common grasses on the plains belong to the genera *Themeda*, *Eragrostis*, *Heteropogon* and *Elionurus*. High diversity of herbs, many of which belong to the Asteraceae, is also a typical feature. Rocky hills and ridges carry sparse (savannoid) woodlands with *Protea caffra* subsp. *caffra*, *P. welwitschii*, *Acacia caffra* and *Celtis africana*, accompanied by a rich suite of shrubs among which the genus *Rhus* (especially *R. magalismonata*) is most prominent. Figure 3 shows some of the large trees occurring around the site and these are mainly alien trees.

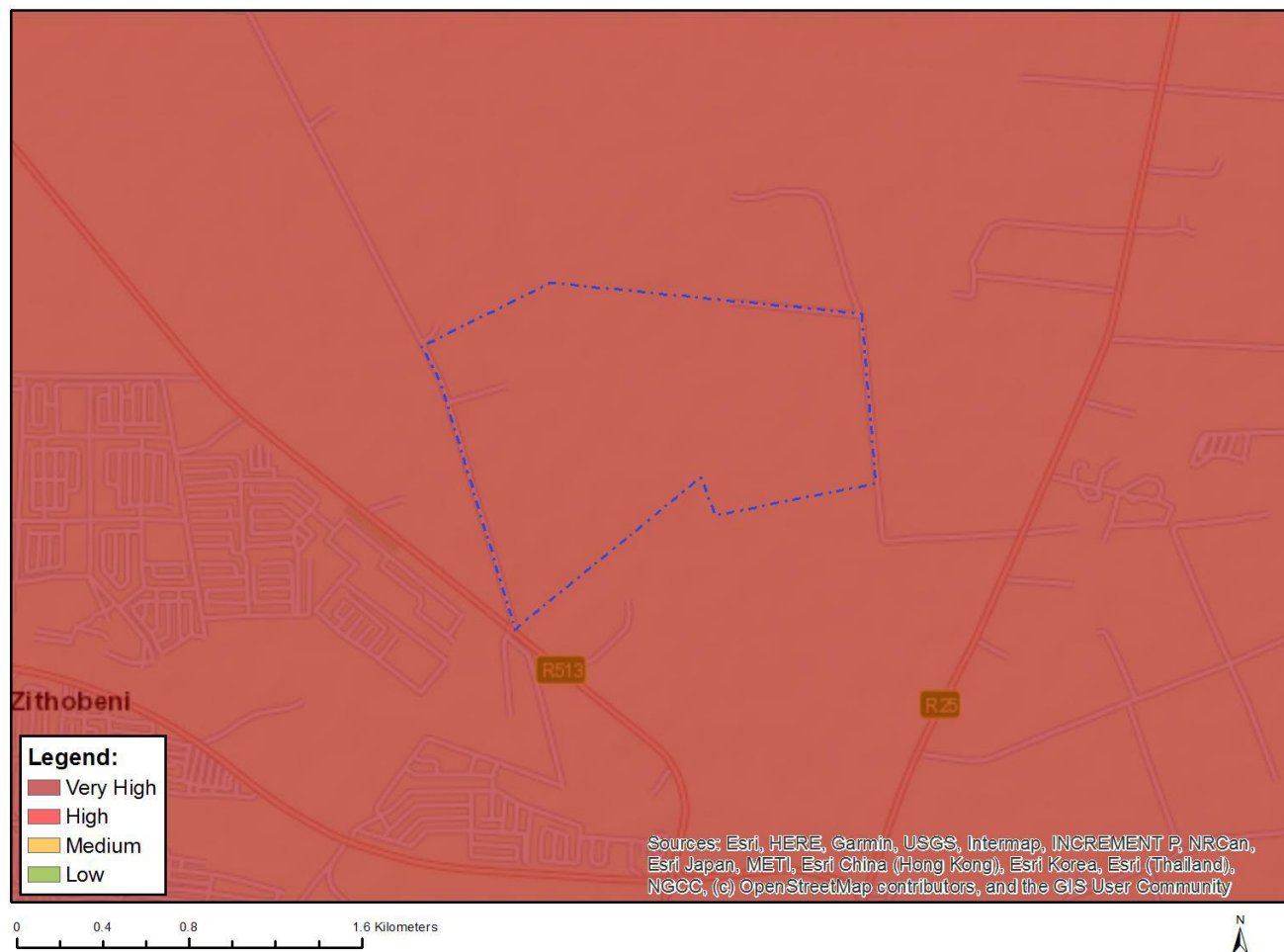


Figure 17: Map of Relative Terrestrial Biodiversity Theme Sensitivity ( Ecological Support Area)



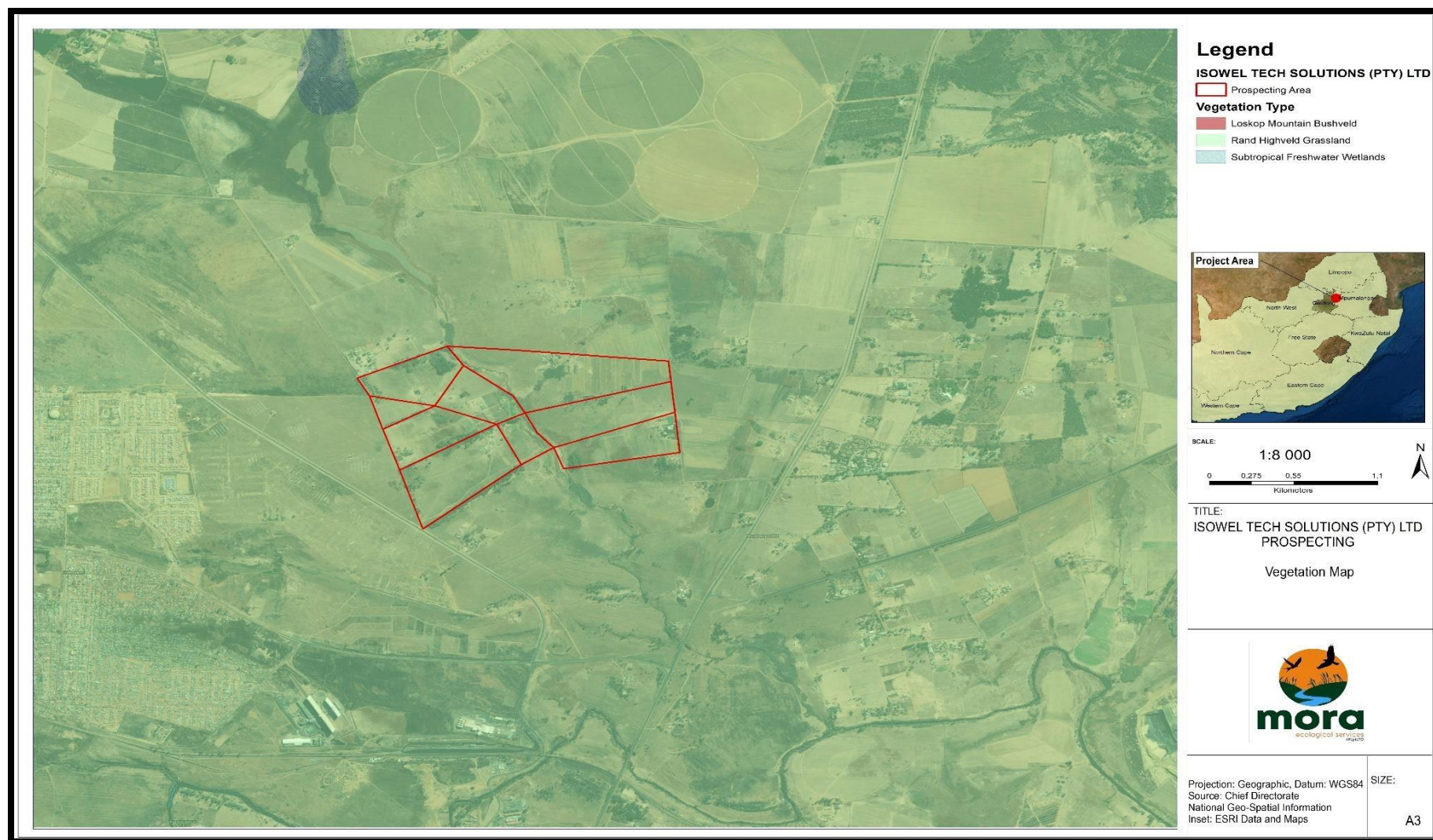


Figure 18: Vegetation map of the study site.





Coral tree



Row of Eucalyptus and grassland



Siringa



Black Locust tree

Figure 19: Typical trees around the study site.

According to the C-plan, majority of the habitats within the study site do not fall under any conservation plan. Sensitive areas are mainly associated with the watercourse and southern site of one portion. Groundtruthing revealed that the site that falls under Important Area is infested with large *Eucalyptus* trees .





Figure 20: Gauteng C-Plan Map.

#### **4.1.8.3 Important Bird and Biodiversity Area**

BirdLife's Important Bird and Biodiversity Area concept has been developed and applied for over 30 years. Considerable effort has been devoted to refining and agreeing a set of simple but robust criteria that can be applied worldwide.

Initially, IBAs were identified only for terrestrial and freshwater environments, but over the past decade, the IBA process and method has been adapted and applied in the marine realm. In 2012, BirdLife published the first Marine IBA "e-atlas", with details of 3,000 IBAs in coastal and territorial waters as well as on the high seas

Important Bird and Biodiversity Areas (IBAs) are:

- Places of international significance for the conservation of birds and other biodiversity;
- Recognised world-wide as practical tools for conservation;
- Distinct areas amenable to practical conservation action;
- Identified using robust, standardised criteria; and
- Sites that together form part of a wider integrated approach to the conservation and sustainable use of the natural environment

Desktop and groundtruthing revealed that there are no Important Bird Areas near the study area.

#### **4.1.8.4 Mining and Biodiversity Guideline**

The mining industry plays a vital role in the growth and development of South Africa and its economy. Since the earliest discoveries of minerals in the region, this rich endowment of mineral resources has been a key driver of South Africa's social and economic development. Furthermore, mining continues to be one of the most significant sectors of our economy, providing jobs, growing our GDP and building relations with international trading partners (Mining Biodiversity Guideline, 2013).

The guideline also provides a four-hierarchy mitigation to help developers in avoiding impacts. The steps are as follow:

- Avoid or prevent
- Minimise
- Rehabilitate
- Offset

Critical Biodiversity Areas are also considered under these guidelines and special attention should be given to these biodiversity areas during prospecting or mining phase.

Although mining industry plays a vital role, it can also impact the biodiversity negatively if environmental laws are disregarded and not enforced. It is imperative for mining industries to adhere to these guidelines.

#### **4.1.8.5 METHODOLOGY**

Our methodology included both background information search (Desktop) and field survey. Below is the method used in our study for each of the subfields of biodiversity and the limitations encountered:

#### 4.1.8.5.1 Flora Study

Transect walk method was used to identify the plants and vegetation structure occurring on the study site. Plants that could not be identified on site were photographed for later identification

#### 4.1.8.5.2 Limitations:

- Duration of the field survey. Not all sections were covered during this phase as this is a prospecting phase.
- Plants that were not flowering at the time of the survey
- Sampling frequency

#### 4.1.8.5.3 Recommendations:

- Majority of the habitats have been transformed. Exploration within these disturbed sites will not pose major risk.

#### 4.1.8.5.4 Fauna Study

Visual observations stand counts and indirect counts method were used to assess the animals occurring on the study site. Observations were made while walking through the site and while driving in some instances. The stand counts involved two observers who would sit quietly and wait for the animals to pass. Whereas the indirect counts included the searching of faecal matter/ pellets. Active search for reptiles and other small mammals was conducted by turning rocks and dead logs.

#### 4.1.8.5.5 Limitations:

- Duration of the field survey
- Sampling frequency
- Circadian rhythm of animals (diurnal animals could not be detected)

#### 4.1.8.5.6 Red Data Analysis and Floral Assessment

SANBI NEW POSA was compared to relevant literature detailing Protected and Red Data plant species lists in order to compile a list of Red Data plant species that may potentially occur within the study area. There are no historical floral records around the study area. The status is determined in table below

Table 4: Red Data Status definitions (SANBI, 2010).

<b>p- protected Species M- Medicinal species</b>		
<b>EX</b>	<b>Extinct</b>	A taxon is Extinct when there is no reasonable doubt that the last individual has died. Taxa should be listed as extinct only once exhaustive surveys throughout the historic range have failed to record an individual.
<b>EW</b>	<b>Extinct in the Wild</b>	A taxon is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.

<b>CR PE</b>	<b>Critically Endangered (Possibly Extinct)</b>	Critically Endangered (Possibly Extinct) taxa are those that are, on the balance of evidence, likely to be extinct, but for which there is a small chance that they may be extant. Hence, they should not be listed as Extinct until adequate surveys have failed to record the taxon.
<b>CR</b>	<b>Critically Endangered</b>	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the five IUCN criteria for Critically Endangered and is therefore facing an extremely high risk of extinction in the wild.
<b>EN</b>	<b>Endangered</b>	A taxon is Endangered when the best available evidence indicates that it meets any of the five IUCN criteria for Endangered and is therefore facing a very high risk of extinction in the wild.
<b>VU</b>	<b>Vulnerable</b>	A taxon is Vulnerable when the best available evidence indicates that it meets any of the five IUCN criteria for Vulnerable and is therefore facing a high risk of extinction in the wild.
<b>NT</b>	<b>Near Threatened</b>	A taxon is Near Threatened when available evidence indicates that it nearly meets any of the five IUCN criteria for Vulnerable and is therefore likely to qualify for a threatened category in the near future.
<b>CRITICALLY RARE</b>		A taxon is Critically Rare when it is known to occur only at a single site but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to the five IUCN criteria.
<b>RARE</b>		A taxon is Rare when it meets any of the four South African criteria for rarity but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to the five IUCN criteria.
<b>DECLINING</b>		A taxon is Declining when it does not meet any of the five IUCN criteria and does not qualify for the categories Critically Endangered, Endangered, Vulnerable or Near Threatened, but there are threatening processes causing a continuing decline in the population.
<b>DDD</b>	<b>Data Deficient— Insufficient Information</b>	A taxon is DDD when there is inadequate information to make an assessment of its risk of extinction, but the taxon is well defined. Data Deficient is not a category of threat. However, listing of taxa in this category indicates that more information is required, and that future research could show that a threatened classification is appropriate.
<b>LC</b>	<b>Least Concern</b>	A taxon is Least Concern when it has been evaluated against the five IUCN criteria and does not qualify for the categories Critically Endangered, Endangered, Vulnerable or Near Threatened, and it is not rare, and the population is not declining.

#### 4.1.8.5.7 Ecological function

Ecological function relates to the degree of ecological connectivity between systems within a landscape matrix. Therefore, systems with a high degree of landscape connectivity amongst one another are perceived to be more sensitive and will be those contributing to ecosystem service (for example wetlands for water and food) or overall preservation of biodiversity. Conservation importance relates to species diversity, endemism (unique species or unique processes) and the high occurrence of threatened and protected species or ecosystems protected by legislation.

#### 4.1.8.5.8 Sensitivity scale

- **High ecological function:** Sensitive ecosystems with either low inherent resistance or resilience towards disturbance factors or highly dynamic systems considered to be stable and important for the maintenance of ecosystems integrity for example pristine grasslands, pristine wetlands and pristine ridges.

- **Medium ecological function:** Relatively important ecosystems at gradients of intermediate disturbances. An area may be considered of medium ecological function if it is directly adjacent to sensitive/pristine ecosystem.
- **Low ecological function:** Degraded and highly disturbed systems with little or no ecological function.
- **No Go Areas:** Areas that have irreplaceable biodiversity or important ecosystem function values which may be lost permanently if these ecosystems are transformed, with a high potential of also affecting adjacent and/or downstream ecosystems negatively.

#### 4.1.8.5.9 Conservation status of the vegetation

- **High conservation importance:** Ecosystems with high species richness which usually provide suitable habitat for several threatened species. Usually termed 'no-go' areas and unsuitable for development and should be conserved.
- **Medium conservation importance:** Ecosystems with intermediate levels of species diversity without any threatened species. Low-density development may be accommodated, provided the current species diversity is conserved.
- **Low conservation importance:** Areas with little or no conservation potential and usually species poor (most species are usually exotic).

#### 4.1.8.5.10 Cognisance was taken of the following environmental attributes and general information:

- Regional and local vegetation
- Current status of habitats
- Red Data habitat suitability, and
- Digital photographs

#### 4.1.8.5.11 Phytosociological data accumulated include the following:

- Plant species and growth forms
- Dominant plant species
- Cover abundance values, and
- Samples or digital images of unidentified plant species

The site was observed to be of **Low-Medium Ecological Function**. Sensitive areas are associated with watercourse. The images below show the current status of the site.





Current crop farming activities



Dilapidated houses



Invasion of White poplar



Watercourse: no go area

#### 4.1.8.6 RESULTS

Biological diversity everywhere is at great risk as a direct result of an ever-expanding human population and its associated needs for energy, water, food and minerals. Landscape transformation that is needed to accommodate these activities inevitably leads to habitat loss and habitat fragmentation, resulting in the mosaical appearance of undisturbed habitat within a matrix of transformed areas. These remaining areas of natural habitat are frequently too small to support the biodiversity that previously occupied the area, and the region loses its ecological integrity (Kamffer 2004). Conservation of the remaining ecosystem is vital and beneficial in the long run.

The assessment results half of the site has been severely transformed due to agricultural activities, human settlements and alien invasion. Areas that have been moderately modified are mainly associated with watercourses. Historical records of flora and faunal species previously recorded around the study area is listed in the appendices.

##### 4.1.8.6.1 Plants

Table 5: List of plant species recorded at the study site.

Species	Common Name	Growth Form	IUCN Conservation Status
<i>Eragrostis curvula</i>	Weeping Love grass	Grass	LC



<i>Eragrostis capensis</i>	Heart-seed love grass	Grass	LC
<i>Setaria sphacelata</i>	Golden bristle grass	Grass	LC
<i>Aristida congesta</i>	Tassle three-awn grass	Grass	LC
<i>Melinis repens</i>	Natal Grass	Grass	LC
<i>Erythrina lysistemon</i>	Common coral tree	Tree	LC
<i>Gomphocarpus fruticosus</i>	Milkweed	Shrub	LC
<i>Hypoxis rigidula</i>	Silver-leaved star flower	Herb	NE
<i>Typha capensis</i>	Bulrush	Tree	LC
<i>Combretum apiculatum</i>	Red bushwillow	Tree	LC

#### 4.1.8.6.2 Weeds and Invasive Plants

The presence of several weeds and poor-quality species strongly reflects the transformed and degraded nature of the study site. The infestation of the listed invasive plants is high and requires intervention. The following weeds and invasive plant taxa were recorded within the study site.

Table 6: List of weeds and invasive species for the study area

<b>Species</b>	<b>Common Name</b>	<b>Growth Form</b>	<b>IUCN Conservation Status</b>
<i>Acacia mearnsii</i>	Black Wattle	Tree	Declared Category 2
<i>Eucalyptus camaldulensis</i>	River red gum	Tree	Declared Category 1b
<i>Verbena bonariensis</i>	Tall Verbena	Herb	Declared Category 1b
<i>Solanum mauritianum</i>	Bug Weed	Herb	Declared Category 1b
<i>Populus alba</i>	White poplar	Tree	Declared Category 2
<i>Callistemon viminalis</i>	Bottlebrush	Shrub	Declared Category 3
<i>Melia azedarach</i>	Syringa	Tree	Declared Category 1b
<i>Pinus elliotti</i> Engelm. and hybrids, varieties and selections	Patula Pine	Tree	Declared Category 2
<i>Morus alba</i>	Mulberry	Tree	Declared Category 3
<i>Argemone mexicana</i>	Yellow-flowered Mexican poppy	Herb	Declared Category 1b
<i>Opuntia ficus-indica</i>	Sweet prickly pear	Tree	Declared Category 1b
<i>Agave americana</i>	Century plant	Succulent	Category in Western Cape. Not listed elsewhere.
<i>Robinia pseudoacacia</i>	Black Locust	Tree	Declared Category 1b

#### 4.1.8.6.3 Birds

Birds are regarded as one of the most useful bioindicators, and they have been used extensively as models to determine ecosystem function (see review Koskimies 1989; Potts et al. 2014; Bregman et al. 2016). High levels of human disturbance as well as habitat transformation and degradation on the study site and adjacent areas would result in the disappearance of the more elusive bird species. Majority of the birds recorded around the study site are generalists.

Table 7: List of bird species recorded at the study site.

Species	Common Name	IUCN Conservation Status
<i>Saxicola torquatus</i>	African Stonechat	LC
<i>Motacilla capensis</i>	Cape Wagtail	LC
<i>Vanellus armatus</i>	Blacksmith Lapwing	LC
<i>Alopochen aegyptiaca</i>	Egyptian Goose	LC
<i>Ardea melanocephala</i>	Black-headed Heron	LC
<i>Cisticola aberrans</i>	Lazy Cisticola	LC
<i>Spilopelia senegalensis</i>	Laughing Dove	LC
<i>Bostrychia hagedash</i>	Hadedda Ibis	LC
<i>Streptopelia capicola</i>	Cape Turtle-Dove	LC
<i>Passer domesticus</i>	House Sparrow	LC
<i>Passer melanurus</i>	Cape Sparrow	LC
<i>Corvus albus</i>	Pied Crow	LC

#### 4.1.8.6.4 Mammals

Only one mammal species was observed during the survey, which was Slender Mongoose (*Herpestes sanguineus*). The area would not support a variety of mammals due to presence of humans and domestic dogs

#### 4.1.8.6.5 Reptiles

Herpetofauna do occur in human modified landscapes, so encouraging appropriate matrix and uses could contribute to their conservation. No reptiles were recorded during the survey.

### 4.1.9 Heritage Resources

Archaeological reconnaissance of the study area was conducted by means of inspecting historical aerial imagery and topographical maps in order to identify potential heritage remains. The historical topographical datasets dating to 1941, 1944, 1970, 1984, 1995, 2003 and 2010, as well as the historical aerial images dating to 1939, 1961, 1965 and 1976, proved useful in terms of providing an indication of potential heritage sites and past land uses associated with the study area. Twelve potential sites were observed within the demarcated boundary. Based on contemporary satellite imagery, seven of the sites appear to have been demolished as no surface remains are visible, while the remaining five sites are associated with building/structures. The exact state of the sites, however, can only be verified during a site visit. The total area inspected was roughly 163 ha.

Because heritage resources are often associated with perennial and non-perennial rivers/streams, the non-perennial stream intersecting the study area was buffered by a distance of 500 m, indicating a potentially sensitive area. The area previously/currently associated with cultivated land was traced and plotted, indicating an area less sensitive from a heritage perspective.

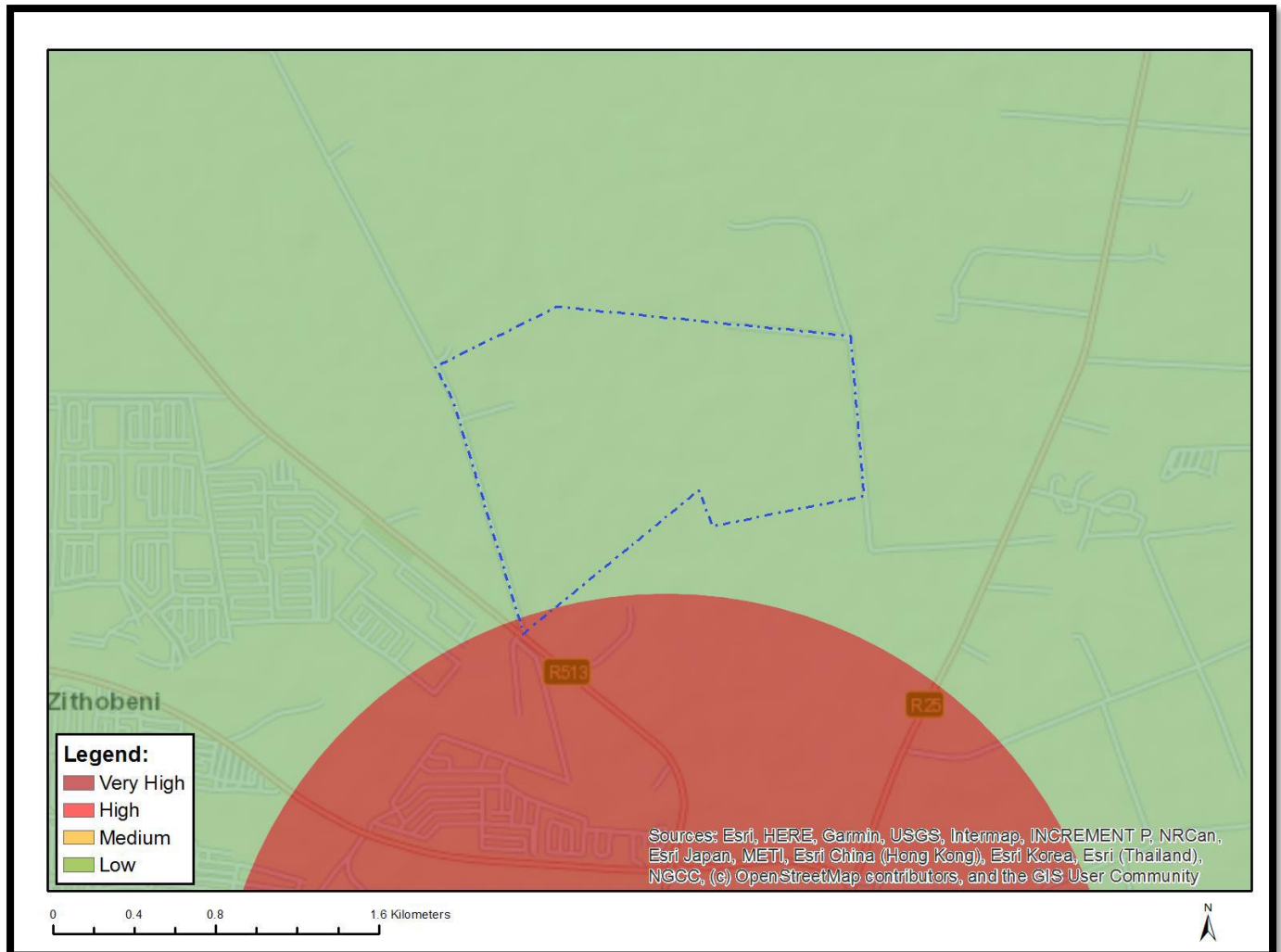


Figure 21: Map of Relative Archaeological and Cultural Heritage Theme Sensitivity

Table 8: Potential site location.

Site No	Type	Parent Farm	Farm Portion	Current Status	Estimated Extent (ha)	Lat (y)	Lon (x)
K01	Building	Roodepoort 504 JR	10	Demolished	0.5	-25.770151	28.745992
K02	Building	Roodepoort 504 JR	14	Demolished	2.3	-25.768406	28.756850
K03	Building	Roodepoort 504 JR	14	Demolished	0.6	-25.767973	28.753306
K04	Building	Roodepoort 504 JR	14	Surface Remains	1.9	-25.767312	28.751926
K05	Building	Roodepoort 504 JR	14 & 24	Demolished	1.4	-25.770111	28.752634
K06	Building	Roodepoort 504 JR	211	Demolished	0.6	-25.771558	28.746744

K07	Building	Roodepoort 504 JR	211	Surface Remains	1.6	-25.773661	28.743444
K08	Building	Roodepoort 504 JR	211	Demolished	0.2	-25.770859	28.745048
K09	Building	Roodepoort 504 JR	212	Surface Remains	14.5	-25.775248	28.745219
K10	Building	Roodepoort 504 JR	212	Surface Remains	1.6	-25.773118	28.748097
K11	Building	Roodepoort 504 JR	23	Demolished	1.1	-25.773243	28.754727
K12	Building	Roodepoort 504 JR	23	Surface Remains	1.1	-25.772083	28.758421

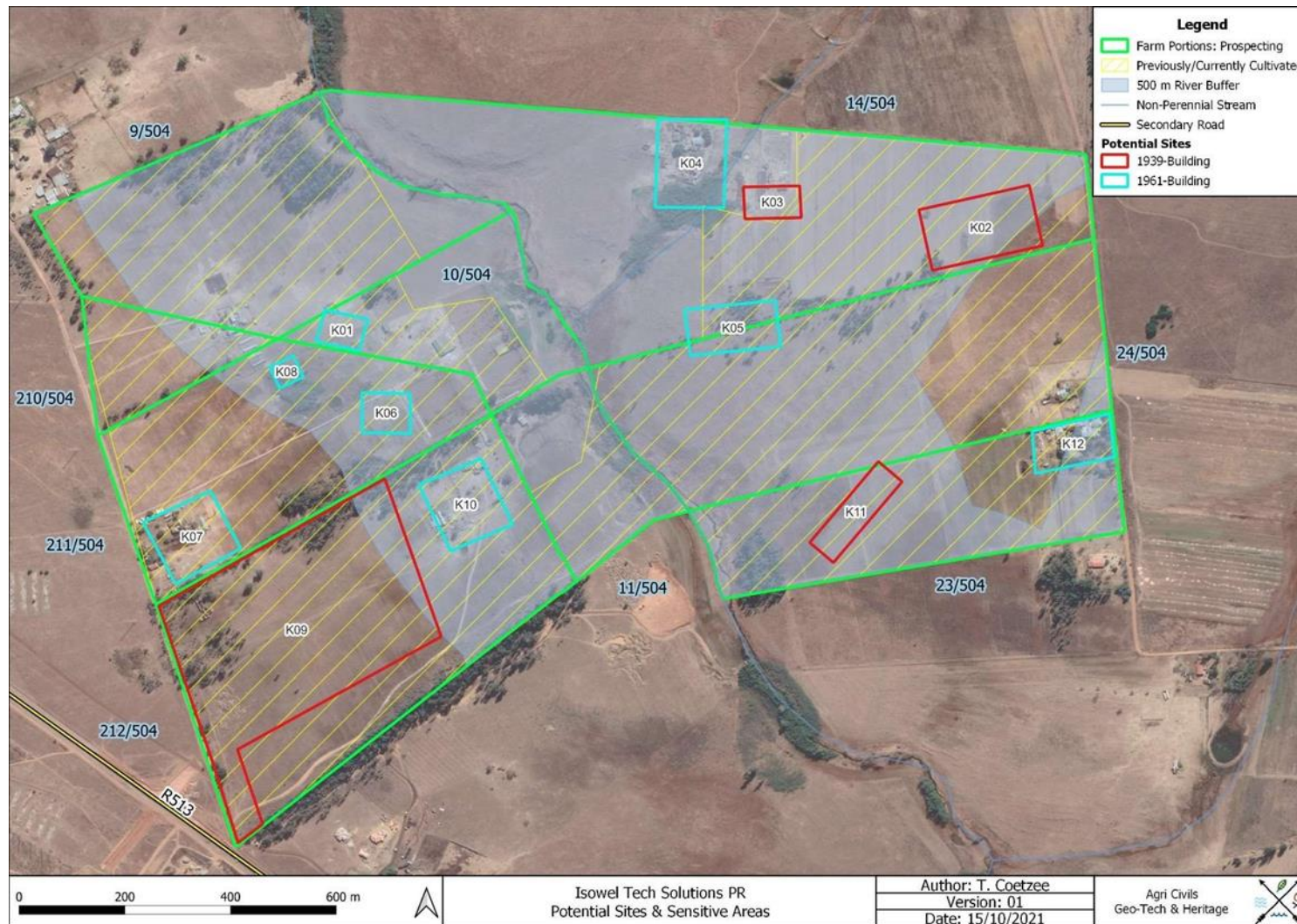


Figure 22: Potential Sites & Sensitive Areas.

#### **4.1.9.1 Archaeological Background**

Southern African archaeology is broadly divided into the Early, Middle and Later Stone Ages; Early, Middle and Later Iron Ages; and Historical or Colonial Periods. This section of the report provides a general background to archaeology in South Africa.

##### **4.1.9.1.1 The Stone Age**

The earliest stone tool industry, the Oldowan, was developed by early human ancestors which were the earliest members of the genus *Homo*, such as *Homo habilis*, around 2.6 million years ago. It comprises tools such as cobble cores and pebble choppers (Toth & Schick 2007). Archaeologists suggest these stone tools are the earliest direct evidence for culture in southern Africa (Clarke & Kuman 2000). The advent of culture indicates the advent of more cognitively modern hominins (Mitchell 2002: 56, 57).

The Acheulean industry completely replaced the Oldowan industry. The Acheulean industry was first developed by *Homo ergaster* between 1.8 to 1.65 million years ago and lasted until around 300 000 years ago. Archaeological evidence from this period is also found at Swartkrans, Kromdraai and Sterkfontein. The most typical tools of the ESA (Early Stone Age) are handaxes, cleavers, choppers and spheroids. Although hominins seemingly used handaxes often, scholars disagree about their use. There are no indications of hafting, and some artefacts are far too large for it. Hominins likely used choppers and scrapers for skinning and butchering scavenged animals and often obtained sharp ended sticks for digging up edible roots. Presumably, early humans used wooden spears as early as 5 million years ago to hunt small animals.

Middle Stone Age (MSA) artefacts started appearing about 250 000 years ago and replaced the larger Early Stone Age bifaces, handaxes and cleavers with smaller flake industries consisting of scrapers, points and blades. These artefacts roughly fall in the 40-100 mm size range and were, in some cases, attached to handles, indicating a significant technical advance. The first *Homo sapiens* species also emerged during this period. Associated sites are Klasies River Mouth, Blombos Cave and Border Cave (Deacon & Deacon 1999).

Although the transition from the Middle Stone Age to the Later Stone Age (LSA) did not occur simultaneously across the whole of southern Africa, the Later Stone Age ranges from about 20 000 to 2000 years ago. Stone tools from this period are generally smaller, but were used to do the same job as those from previous periods; only in a different, more efficient way. The Later Stone Age is associated with: rock art, smaller stone tools (microliths), bows and arrows, bored stones, grooved stones, polished bone tools, earthenware pottery and beads. Examples of Later Stone Age sites are Nelson Bay Cave, Rose Cottage Cave and Boomplaas Cave (Deacon & Deacon 1999). These artefacts are often associated with rocky outcrops or water sources. The LSA site, Fort Troje, is located just north of Cullinan and approximately 37 km northwest of the proposed Isowel Tech Solutions (Pty) Ltd Project (Korsman et al. 1998: 95). Figures 5 – 7 below illustrate stone tools often associated with the ESA, MSA and LSA of southern Africa.

Tobias Coetzee ©





Figure 23: ESA artefacts from Sterkfontein (Volman 1984).

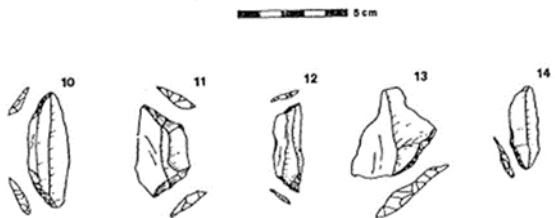


Figure 24: MSA artefacts from Howiesons Poort (Volman 1984).



Figure 25: LSA scrapers (Klein 1984).

#### 4.1.9.1.2 The Iron Age & Historical Period

The Early Iron Age marks the movement of farming communities into South Africa in the first millennium AD, or around 2500 years ago (Mitchell 2002:259, 260). These groups were agro-pastoralist communities that settled in the vicinity of water in order to provide subsistence for their cattle and crops. Archaeological evidence from Early Iron Age sites is mostly artefacts in the form of ceramic assemblages. The origins and archaeological identities of this period are largely based upon ceramic typologies. Some scholars classify Early Iron Age ceramic traditions into different “streams” or “trends” in pot types and decoration, which emerged over time in southern Africa. These “streams” are identified as the Kwale Branch (east), the Nkope Branch (central) and the Kalundu Branch (west). Early Iron Age ceramics typically display features such as large and prominent inverted rims, large neck areas and fine elaborate decorations. This period continued until the end of the first millennium AD (Mitchell 2002; Huffman 2007). Some well-known Early Iron Age sites include the Lydenburg Heads in Mpumalanga, Happy Rest in the Limpopo Province and Mzonjani in Kwa-Zulu Natal.

The Middle Iron Age roughly stretches from AD 900 to 1300 and marks the origins of the Zimbabwe culture. During this period cattle herding appeared to play an increasingly important role in society. However, it was proved that cattle remained an important source of wealth throughout the Iron Age. An important shift in the Iron Age of southern Africa took place in the Shashe-Limpopo basin during this period, namely the development of class distinction and sacred leadership. The Zimbabwe culture can be divided into three periods based on

certain capitals. Mapungubwe, the first period, dates from AD 1220 to 1300, Great Zimbabwe from AD 1300 to 1450, and Khami from AD 1450 to 1820 (Huffman 2007: 361, 362).

The Late Iron Age (LIA) roughly dates from AD 1300 to 1840. It is generally accepted that Great Zimbabwe replaced Mapungubwe. Some characteristics include a greater focus on economic growth and the increased importance of trade. Specialisation in terms of natural resources also started to play a role, as can be seen from the distribution of iron slag which tend to occur only in certain localities compared to a wide distribution during earlier times. It was also during the Late Iron Age that different areas of South Africa were populated, such as the interior of KwaZulu Natal, the Free State, the Gauteng Highveld and the Transkei. Another characteristic is the increased use of stone as building material. Some artefacts associated with this period are knife-blades, hoes, adzes, awls, other metal objects as well as bone tools and grinding stones.

The Historical period mainly deals with Europe's discovery, settlement and impact on southern Africa. Some topics covered by the Historical period include Dutch settlement in the Western Cape, early mission stations, Voortrekker routes and the Anglo Boer War. This time period also saw the compilation of early maps by missionaries, explorers, military personnel, etc.

#### 4.1.9.1.3 The 1st Anglo-Boer War - The Battle of Bronkhorstspuit

In 1874 Lord Carnarvon, the Colonial State Secretary, wished to unite British territory and the two Republics under the British flag. Because none of these states were in favour of uniting, Carnarvon reasoned that through uniting with the Transvaal, the others would follow. Due to poor relations, the only option left was annexation. In 1877 Shepstone was sent from Natal to Pretoria with a police force of 25 with the goal to annex the Transvaal. On 12 April 1877, Shepstone raised the British flag and the Transvaal was annexed without firing a single shot. Several deputations were sent to England to regain independence, but both failed. Consequently S. P. J. Kruger, P. Joubert and M. W. Pretorius decided to gather the nation at Paardekraal to discuss the future of the Transvaal. During the meeting, which lasted from 12 to 16 December 1880, it was decided that Heidelberg would serve as the seat of the government. British forces were stationed in most of the towns, but were too weak to launch attacks on the Boer forces. British forces were therefore ordered from Lydenburg to support forces in Pretoria. Upon receiving this news, Frans Joubert was sent from Heidelberg to Pretoria with a force consisting of between 200 and 300 men to intercept and stop these reinforcements. According to the historian, Theal, the British forces under Col. Anstruther consisted of 257 men and 34 wagons. On 20 December 1880 they arrived at the place known today as Bronkhorstspuit. A brief exchange of words in which Joubert requested Anstruther to discontinue his mission resulted in a 10 to 20-minute battle over open field. After a significant number of casualties on the British side, Col. Anstruther, who was mortally wounded, requested that the white flag be raised. According to Theal, 66 on the British side were killed and 72 wounded. Tobias Coetzee ©

Ten of the wounded eventually succumbed to their wounds as well. On the Boers' side, one commando member was killed in action and another five wounded. Later, another succumbed to his wounds. The captives were transported to Heidelberg and from there to the Vaal River. From there they were allowed to go to the Free State. This was the first open battle of the First Boer War (Roodt 1949: 7-9).



The photo below depicts the settlement of Paul Grobler on the farm Klipeland, where the Battle of Bronkhorstspuit took place. Grobler bought the farm from Salomon Prinsloo in the 1850's and renamed it from Kalkoenkrans to Klipeland. One of the wounded commando members was treated in this homestead. In the background the homesteads of Marthinus Johannes Grobler can be observed (Rex 1969: 14). The Battle of Bronkhorstspuit took place approximately 7 km south of the proposed Isowel Tech Solutions study area.

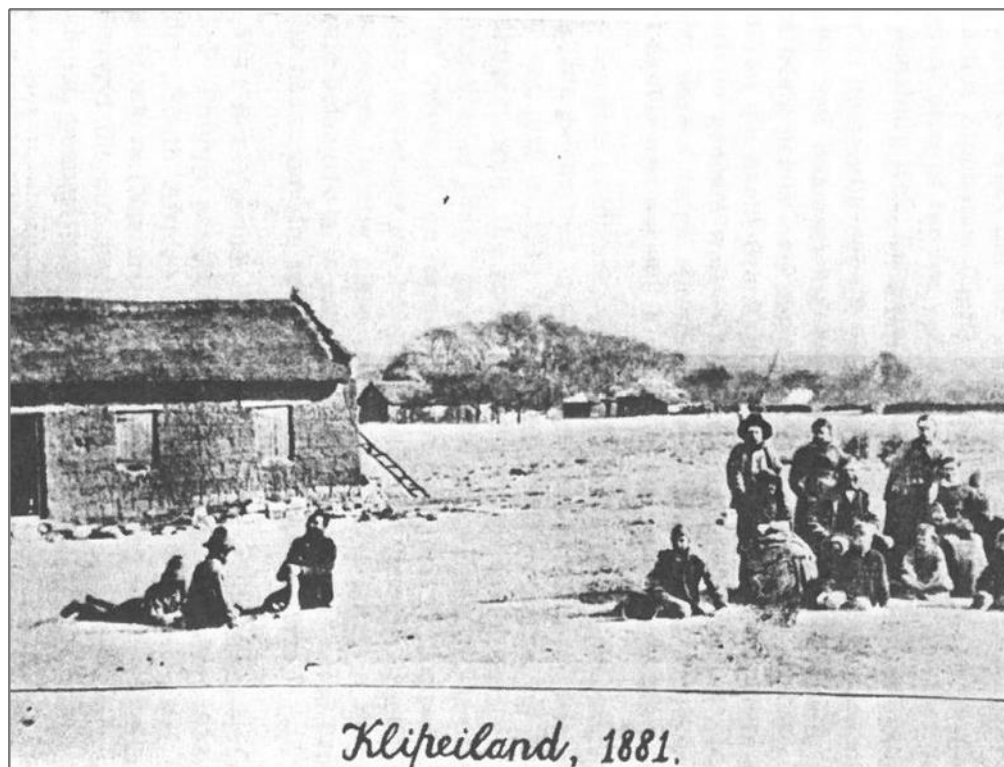


Figure 26: Grobler residence on Klipeland (adapted from Rex 1969).

#### 4.1.9.1.4 Historical aerial Imagery and topographical maps

Historical images and topographical maps dating to 1939, 1941, 1944, 1961, 1965, 1970, 1976, 1984, 1995, 2003 and 2010 (Appendix A) were used to determine the location and relative age of the structures associated with the demarcated portions, as well as the historical land uses.

The aerial image dating to 1939 (Appendix A: Figure 18 of the HIA) indicates the presence of four areas associated with buildings or structures (Sites K02, K03, K09, K11), a road bordering the southern extremity of the study area, as well as several cultivated fields. Only one of these sites (K09) still appears to be associated with buildings or structures. Should these buildings / structures, or parts thereof, form part of the original structure, it would at least be 82 years old. Sites K02, K03 and K09 are also indicated on the 1941/1944 topographical map (Appendix A: Figure 19 of the HIA). Sites K02 and K03 were demolished between 1939 and 1961 (Appendix A: Figure 20 of the HIA), while Site K11 was demolished between 1939 and 1944 (Appendix A: Figure 19).

The 1941 and 1944 topographical map (Appendix A: Figure 19 of the HIA) indicates a hut at Site K02, a kraal at Site K03 and several huts at Site K09. No building or structure, however, is indicated at Site K11. The roads

to the south and east of the study area, as well as some of the cultivated fields are indicated too.

The remaining sites (K01, K04 – K08, K10, K12) were identified as buildings on the 1961 aerial image (Appendix A: Figure 20). Of the eight sites identified on the 1961 aerial image, four of the sites still appear to be associated with buildings or structures (Sites K04, K07, K10, K12). Should these buildings / structures, or parts thereof, form part of the original structure, it would at least be 60 years old. Sites K01 and K08 appear to have been demolished by 1984 (Appendix A: Figure 24 of the HIA), while Site K05 appears to have been demolished by 1995 (Appendix A: Figure 25) and Site K06 by 2003 (Appendix A: Figure 26). It should be noted that between 1976 and 1984, several buildings were erected. These buildings, however, are of contemporary origin and do not exceed 60 years of age.

The eastern half of the demarcated study area saw the greatest expansion of cultivated fields between 1995 and 2003, while the western half appears to have extensively been cultivated since at least 1961.

#### 4.1.9.2

Examples of Heritage Sites, figures Below are examples of heritage sites sometimes encountered – such areas should be avoided.



Figure 27: Example of undecorated potsherds.



Figure 28: Example of a decorated potsherd.





Figure 29: Example of a potential granary base.



Figure 30: Example of a stone-walled site.



Figure 31: Example of a broken lower grinding stone.





Figure 32: Example of a dilapidated stone-walled site.



Figure 33: Example of a historical building.



Figure 34: Example of a potential informal grave.

#### 4.1.9.2.1 Previous Heritage Studies

##### 4.1.9.2.1.1 Clover Hill Development, Bronkhorstspuit Dam

A phase 1 HIA (Heritage Impact Assessment) was conducted for the Clover Hill Housing Estate, which is located about 14 km southwest of the demarcated study area. The Housing Estate is located on the banks of the Bronkhorstspuit Dam. The HIA revealed several stone-walled enclosures belonging to the Late Iron Age, as well as potsherds and middens. Several structures with a square layout were also located, but probably do not exceed 60 years of age (National Cultural History Museum 2003).

##### 4.1.9.2.1.2 Nooitgedacht 525JR

The HIA survey conducted for the development of a housing estate on Portion 9 of the Farm Nooitgedacht 525 JR, located 6.6 km south of the proposed development, revealed two heritage sites. It is in the same area where the Battle of Bronkhorstspuit took place. These sites date to the Historic period (Van Schalkwyk 2007).

##### 4.1.9.2.1.3 Ekangala Borrow Pit Extension

Van Schalkwyk (2013) conducted a Heritage Impact Assessment for the extension of the Ekangala Borrow Pit located approximately 11 km northwest of the proposed Isowel Tech Solutions project area. The HIA did not record any heritage sites in close proximity of the borrow pit, but noted that farmsteads and cemeteries occur in the general vicinity.

#### 4.1.9.2.2 Evaluation

The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the National Heritage Resources Act, 1999, while other historical and cultural significant sites, places and features, are generally determined by community preferences.

A fundamental aspect in the conservation of a heritage resource relates to whether the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. There are many aspects that must be taken into consideration when determining significance, such as rarity, national significance, scientific importance, cultural and religious significance, and not least, community preferences. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and if appropriate mitigated in order to gain data / information which would otherwise be lost. Such sites must be adequately recorded and sampled before being destroyed.

### 4.1.9.3 Statement of Significance & Recommendations

#### 4.1.9.3.1 Statement of significance

The study area: Portions 9, 10, 11, 14, 23, 24, 210, 211 and 212 of the Farm Roodepoort 504 JR, Gauteng. As can be seen from previous research done in the area, the general region is significant from a heritage perspective. Heritage sites are likely to include LSA sites, LIA sites, cemeteries and historical structures. Since heritage sites, such as graves, are not always clearly identifiable as it might consist of disturbed surface indications, care must be exercised when prospecting. Figure above indicates the areas that are potentially

sensitive from a heritage perspective, as well as the areas historically and currently associated with cultivated fields.

#### 4.1.9.3.2 Portions 9, 11 and 210 of the Farm Roodepoort 504 JR

No sites of potential heritage remains were observed on historical aerial imagery and topographical maps. Contemporary buildings and structures, however, are visible on recent satellite imagery.

#### 4.1.9.3.3 Portion 10 of the Farm Roodepoort 504 JR

Demolished Site K01, located in the western corner of the farm portion, was identified as a building on the 1961 aerial image. A possibility, however, exists that subsurface culturally significant material might be associated with the site. Contemporary buildings that appear not to exceed 60 years of age are also associated with the farm portion. These buildings and structures do not exceed 60 years of age and are therefore not protected under the NHRA (25 of 1999).

#### 4.1.9.3.4 Portion 14 of the Farm Roodepoort 504 JR

Portion 14 is associated with two sites dating to 1939 (Sites K02 & K03) and two sites dating to 1961 (Sites K04 & K05). Sites K02, K03 and K05 consisted of buildings, but appear to have been demolished. Site K03 is indicated as a kraal on a topographical map, but seems to have been replaced by modern infrastructure. The possibility, however, exists that subsurface culturally significant material might be associated with the sites. Site K05 intersects Portions 14 and 25.

Site K04 was identified as a building on the 1961 aerial image and appears still to be associated with intact buildings and structures. Should the buildings and structures associated with this site form part of the original structures, it would exceed 60 years of age and would therefore be protected under the NHRA (25 of 1999).

#### 4.1.9.3.5 Portion 23 of the Farm Roodepoort 504 JR

Portion 23 is associated with two sites: K11 and K12. Site K11 was associated with several buildings as observed on the 1939 aerial image, but the buildings were subsequently demolished. Later topographical maps also indicate the area to be cultivated. The possibility, however, exists that subsurface culturally significant material are associated with the site.

Site K12, located in the north-eastern corner of the farm portion, was identified on the 1961 aerial image and consisted of buildings. Since buildings are still associated with the site, the possibility exists that the buildings and structures, or parts thereof, exceed 60 years of age. Should this be the case, these buildings and structures would be protected under the NHRA (25 of 1999).

#### 4.1.9.3.6 Portion 24 of the Farm Roodepoort 504 JR

Only one sites, K05, partially intersects portion 24. This site is discussed under portion 14. It should also be noted that modern buildings are observed in the south-eastern corner of the study area. These buildings and structures do not exceed 60 years of age and are therefore not protected under the NHRA (25 of 1999).

#### 4.1.9.3.7 Portion 211 of the Farm Roodepoort 504 JR

Portion 211 is associated with three sites: K06, K07 and K08. All three sites were identified as buildings on the

1961 aerial image. Sites K06 and K08 have been demolished, but subsurface culturally significant material might still be associated with the sites. Site K07, however, is still associated with buildings. Should the buildings and structures associated with Site K07 form part of the original structures, it would exceed 60 years of age and would therefore be protected under the NHRA (25 of 1999).

#### 4.1.9.3.8 Portion 212 of the Farm Roodepoort 504 JR

Two sites are located on Portion 212 (Sites K09 & K10). Both sites are still associated with surface remains. Site K09 was identified as an area associated with buildings on the 1939 aerial image and a subsequent topographical map indicates the presence of huts. Although some infrastructure are still visible on contemporary satellite imagery, the site appears to have been disturbed by agricultural activities. Site K10 was identified as buildings on the 1961 aerial image and still appears to be associated with intact buildings. Should the buildings and structures associated with these sites form part of the original structures, it would exceed 60 years of age and would therefore be protected under the NHRA (25 of 1999).

Since heritage sites are often associated with water sources, the 500 m river buffer area should also be considered sensitive from a heritage perspective.



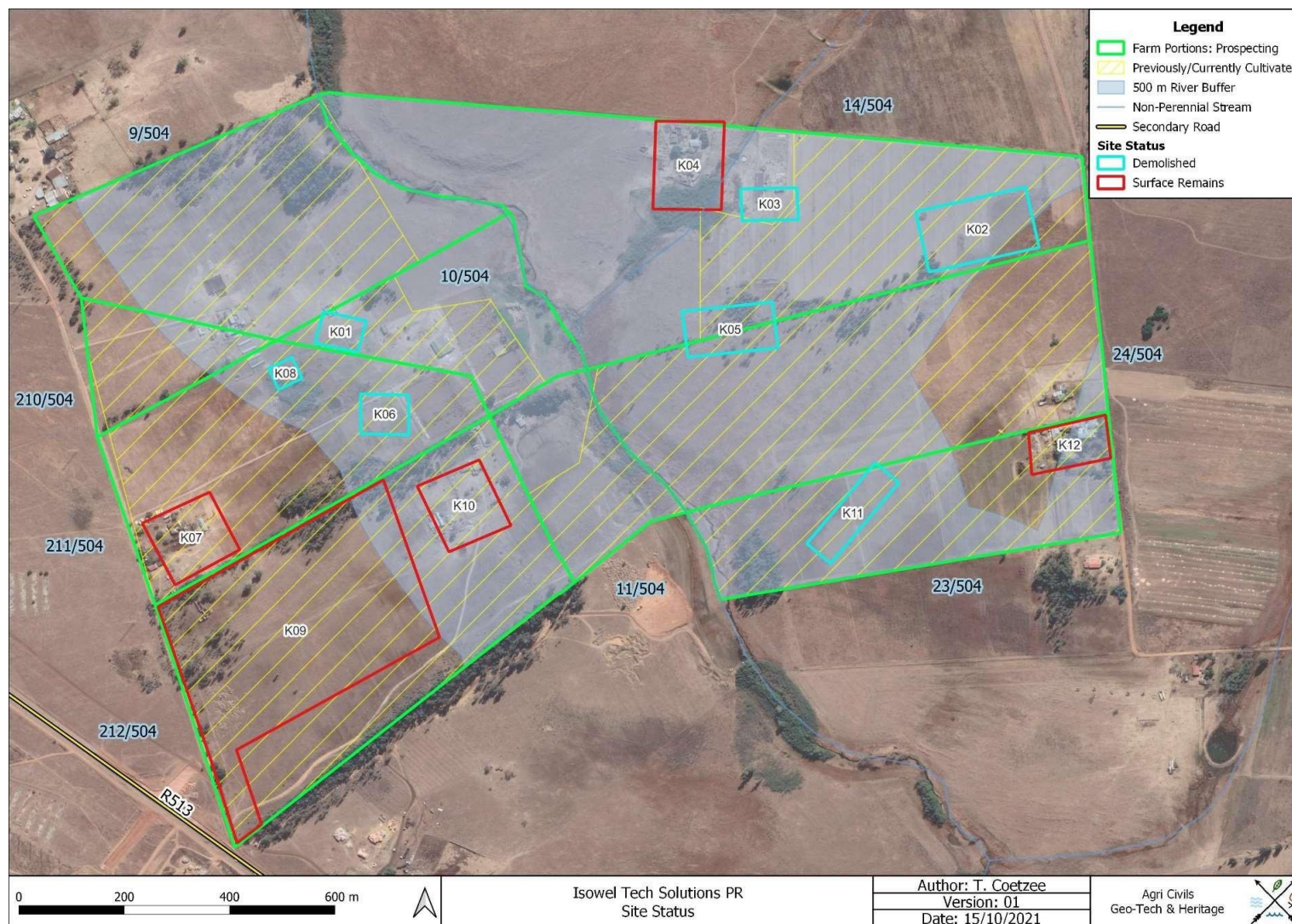


Figure 35:Site Status

## 4.2 Regional Socio-Economic Structure

### 4.2.1 Demographic Profile

The levels of education are directly reflected by employment statistics for the area, with the majority (36.1%) of the population being employed in low to semi-skilled, elementary occupations and approximately 12.5% of the working population in Kungwini are trained in a trade or craft. Further reflecting the employment skills-pool is the distribution of income, which shows that 15% of Kungwini residents are unemployed while the 64% majority earns less than R1600 per month, even though 62.32% are formally employed. Of the population of Kungwini Local Municipality, 7.4% suffer from some disability, while as of 2004, HIV/AIDS was prevalent in 11.9% of the population, which is increasing at an annual rate of 22.8%. The largest economic sectors presenting formal employment opportunities within the Kungwini Local Municipality are, in descending order: Services (33%), manufacturing (19%), trade and finances (14%) and agriculture (8.8%). Of these sectors, agriculture, tourism, manufacturing and mining have been earmarked for development opportunities within the Kungwini Municipal area. The farms in and around Bronkhorstspuit, such as the one upon which the proposed biomass-to-electricity plant is to be developed, accounts for the bulk of production in the district agricultural sector and typically experiences a growth-rate of around 0.5%. The Integrated Development Plan (IDP) for Kungwini has identified the need for poverty alleviation through job creation. The IDP also recognizes the need for the upgrading of water, sanitation, electricity, communication, roads and stormwater infrastructure.

	2007	2012	2017	Average annual growth
Region 1	720 000	818 000	908 000	2.35%
Region 2	306 000	340 000	376 000	2.08%
Region 3	475 000	550 000	610 000	2.54%
Region 4	288 000	387 000	468 000	4.98%
Region 5	72 400	90 200	104 000	3.71%
Region 6	523 000	628 000	715 000	3.18%
Region 7	94 900	109 000	125 000	2.80%
City of Tshwane	2 478 557	2 921 997	3 306 198	2.92%

Figure 36: City of Tshwane population over the years (2007, 2012, 2017)

#### Age and gender distribution

The gender distribution among households heads indicate that just more than a third of all households (36%) in the local study area are headed by females. The age distribution shows that the majority of the local study area's population falls within the 15-64 year bracket. This trend is similar to the regional study area and indicates a potentially large labour force.

#### Education

Education levels among the local population indicates that more than two thirds of individuals not completing secondary schooling, irrespective of their gender grouping. This trend is lower compared to the regional study area.

#### Economic Profile

The manufacturing sector is the largest contributor (30%) to the local study area's economy in terms of GDP, followed by the services, (28%), financial (17%) and trade (12%) sectors. Mining activities within the local study area are relatively limited, with the closest mining operations being Hosken Consolidated Investment's (HCI) Palesa and Phalandwa Collieries, respectively located 18km north-west and 40km south of the proposed project. Agriculture only contributes 3% to the local economy. The bulk of agricultural produce is derived from commercial farms around the Bronkhorstspuit town, primarily producing maize, vegetables beef, groundnuts, cotton, sunflower and sorghum. Given the current low contributions by the agricultural sector to the local economy and the high agricultural potential, this sector has significant potential for growth.

#### **4.3 Description of the current land uses.**

Access to the demarcated study area appears to be through local roads turning from the R25 primary road and R513 secondary road. The majority of the study area appears to be associated with crop cultivation and agricultural activities, while a smaller section along the northern boundary is associated with open veldt. Buildings and infrastructure are visible on all of the Farm Portions.

#### **4.4 Description of specific environmental features and infrastructure on the site.**

- Water course and wetlands
- Ecological Support area
- Open Veld and grassland
- Sheep and Poultry farming
- Infrastructure
- Graves



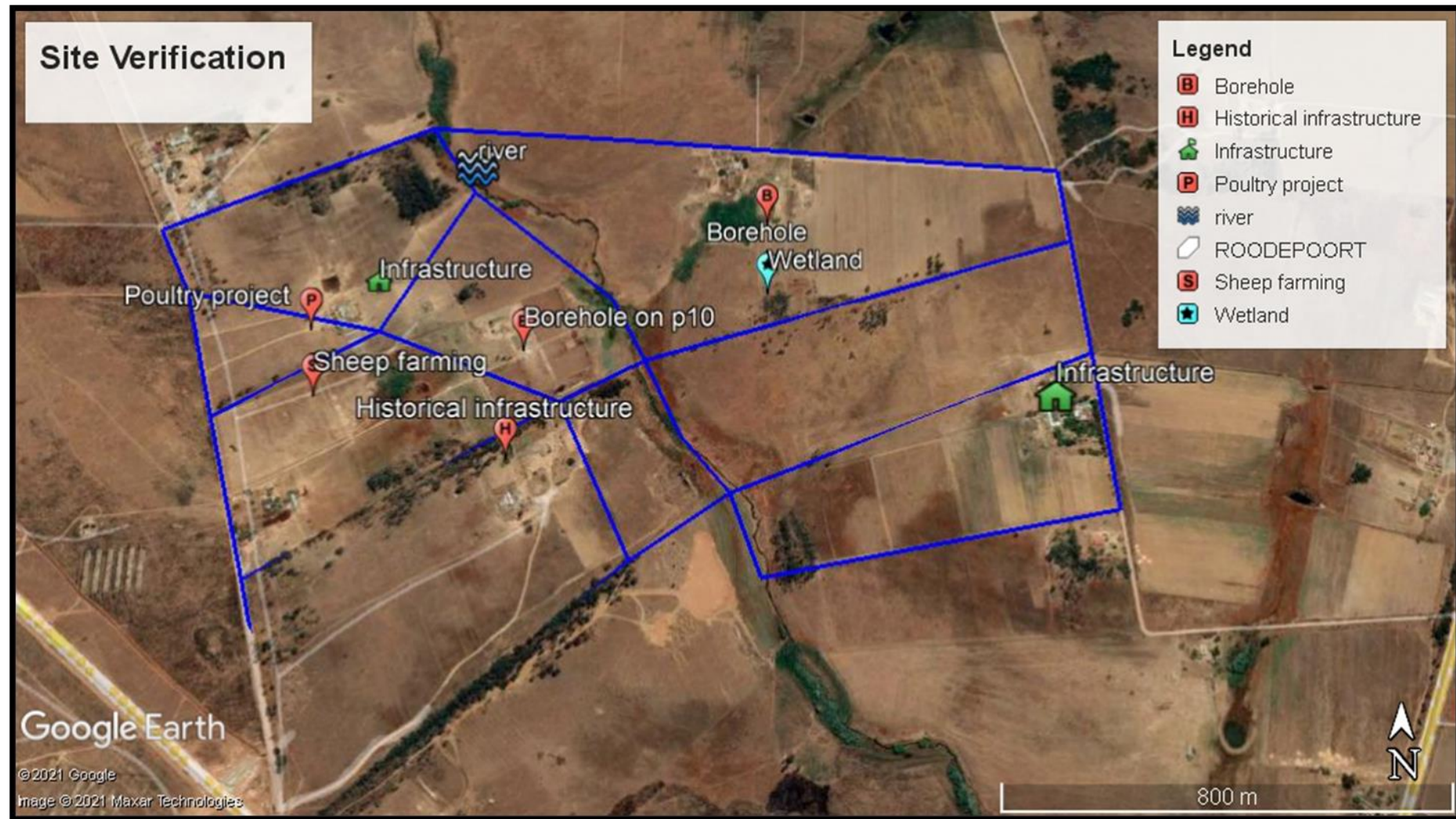


Figure 37: Land Use Map





Figure 38: Gauteng C- Plan showing the ESA on site



#### 4.5 Environmental sensitivity verification

(Show all environmental, and current land use features)

The Screening Tool Report generated from the National Web Based Environmental Screening Tool recorded the following sensitivities and Impact Assessment as contained in the “Procedures to be followed for the assessment and minimum criteria for reporting of identified environmental themes of Section 45 (a) and (h) of the National Environmental Management Act, 1998, when applying for Environmental Authorization” (10 May 2020).

Table 9:Proposed Development Area Environmental Sensitivity

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme			X	
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

##### 4.5.1.1 Environmental Management Frameworks relevant to the application

Olifants EMF	<a href="https://screening.environment.gov.za/ScreeningDownloads/EMF/Zone_46,_67,_78,_80,_92,_103,_122,_129.pdf">https://screening.environment.gov.za/ScreeningDownloads/EMF/Zone_46,_67,_78,_80,_92,_103,_122,_129.pdf</a>
Gauteng EMF	<a href="https://screening.environment.gov.za/ScreeningDownloads/EMF/Zone_46,_67,_78,_80,_92,_103,_122,_129.pdf">https://screening.environment.gov.za/ScreeningDownloads/EMF/Zone_46,_67,_78,_80,_92,_103,_122,_129.pdf</a>

##### 4.5.1.2 Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	12/12/20/1923/2	Solar PV	Approved	16.5

Table 10:Specialist Studies Identified

No	Specialist assessment	Assessment Protocol	Recommended Studies
1	Agricultural Impact Assessment	<a href="https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedGeneralAgricultureAssessmentProtocols.pdf">https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedGeneralAgricultureAssessmentProtocols.pdf</a>	Information collated from previous studies and SANBI as the area falls within an ESA.

2	Archaeological and Cultural Heritage Impact Assessment	<a href="https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedGeneralRequirementAssessmentProtocols.pdf">https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedGeneralRequirementAssessmentProtocols.pdf</a>	Assessed
3	Palaeontology Impact Assessment	<a href="https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedGeneralRequirementAssessmentProtocols.pdf">https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedGeneralRequirementAssessmentProtocols.pdf</a>	Assessed
4	Biodiversity Impact Assessment	<a href="https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedTerrestrialBiodiversityAssessmentProtocols.pdf">https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedTerrestrial Biodiversity Assessment Protocols.pdf</a>	Assessed
5	Aquatic Biodiversity Impact Assessment	<a href="https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedAquaticBiodiversityAssessmentProtocols.pdf">https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedAquatic Biodiversity Assessment Protocols.pdf</a>	Watercourses have been identified and buffer zones implemented.
6	Noise Impact Assessment	<a href="https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedNoiseImpactsAssessmentProtocol.pdf">https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedNoise Impacts Assessment Protocol.pdf</a>	The drilling will be temporary hence no noise impact assessment will be undertaken.
7	Radioactivity Impact Assessment	<a href="https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedGeneralRequirementAssessmentProtocols.pdf">https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedGeneral Requirement Assessment Protocols.pdf</a>	None of the elements are naturally radioactive hence the study is not required.
8	Plant Species Assessment	<a href="https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedPlantSpeciesAssessmentProtocols.pdf">https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedPlant Species Assessment Protocols.pdf</a>	Assessed and Information collated from previous studies and SANBI
9	Animal Species Assessment	<a href="https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedAnimalSpeciesAssessmentProtocols.pdf">https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GazettedAnimal Species Assessment Protocols.pdf</a>	Assessed and Information collated from previous studies and SANBI

#### 4.6 Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as inform by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated).

**Table 11: Potential Impacts**

ACTIVITY	ASPECT	TYPE OF IMPACT	IMPACT DESCRIPTION
Reconnaissance site visit	No Impact		
<b>Desktop Study</b>	No Impact		
<b>Mapping &amp; Surveying</b>	Vegetation	Negative Medium	Clearing of Vegetation for access to the site
<b>Drilling and sampling</b>	Flora	Negative Medium	Clearing of Vegetation for Access tracks and Clearing of Drilling and pitting sites
	Fauna	Negative Medium	The natural habitat of the animals will be disturbed and/or destroyed. Potential roadkill
	Soil	Negative Medium	Removal of topsoil at the drilling and pitting sites
			Soil disturbance from soil sampling resulting in soil erosion
			Soil compaction resulting from repeated use of access roads.
			Oil and Fuel spills from drilling equipment
	Water	Negative Medium	Contamination of ground water and reduction of water quantity
			Change in drainage patterns on areas where the drilling and sampling will occur
			Possible hydrocarbon spills from drill rig.
<b>Access Road</b>	Air	Negative Low	Increased water consumption as water will be used to control dust and for sampling
			Generation of dust on the access tracks and drilling points
	Noise	Negative Low	Noise from the drill rig
	Air quality	Negative Low	Nuisance dust will be created by the prospecting vehicles to and from site
	Fauna	Negative High	Where new temporary tracks will be created the natural habitat of the animals will be disturbed and/or destroyed. Road kills.
	Flora	Negative High	Where new temporary tracks will be created the vegetation will be disturbed and/or destroyed.
	Soil	Negative Low	Compaction of soil is expected on the roads that are used by the prospecting operation. Possible hydrocarbon spills from equipment and vehicles.
	Surface Water	Negative Low	If roads are not properly maintained, water erosion after thunder storms can occur. Possible hydrocarbon spills from equipment and vehicles.
	Visual	Negative Low	The temporary tracks will visible to some extent from the immediate surroundings.

<b>Decommissioning</b>	Air quality	Negative Low	Dust emissions from decommissioning activities (including vehicle entrained dust)
	Ground Water	Negative Low	Possible hydrocarbon spills by vehicles and equipment in this area.
	Noise	Negative Low	Noise will be created by the vehicles and equipment in this area.
	Soil	Negative Medium	Soil erosion resulting from the re-spreading of topsoil before vegetation is re-established Ripping of compacted areas
	Surface Water	Negative Low	Possible hydrocarbon spills by vehicles and equipment in this area.
<b>Analysis of Samples</b>	No impact on site		
<b>Consolidation of results</b>	No impact on site		

**Table 12: Potential Cumulative Impacts**

ASPECT	IMPACTS	DETAILED DESCRIPTION
Climate	Release of greenhouse gas emissions	<ul style="list-style-type: none"> <li>The release of greenhouse gasses and other contaminants to the atmosphere is expected as a result of land based vehicle activity.</li> <li>The clearing of vegetation negatively affects carbon sequestration efficiency and increase emissions resulting from decomposition. These impacts are regarded as insignificant in terms of contribution. The risks are recognised as a cumulative impact.</li> </ul>
Soils	Loss of natural resource (topsoil)	The loss of topsoil as a natural resource as a result of soil contamination and erosion negatively affecting land capability
Coastal	Loss of access and tourism impact	It has been noted that the advancement of mines along the coast has increased access restrictions for the local community and tourism.
Hydrology	Surface water pollution	Surface water quality impacts will extend beyond the boundary of the site if not managed appropriately which in turn affects the agricultural sector highly dependent on this surface water resource.
Geohydrology	Groundwater pollution	Groundwater contamination is regarded as a cumulative impact. Regionally there is a high dependency on groundwater resources and all activities which may impact on ground water resources are regarded as significant.
Biodiversity (Flora, Fauna and Avifauna)	Loss of biodiversity and disruption of existing ecosystem functioning	The cumulative impacts relate to land transformation resulting in the loss of habitat
Visual	Visual disturbance and change of landscape character	The cumulative impacts relate to visual disturbance is regarded to impact the regional “sense of place”. Regionally the site visual has been affected by mining activities.

#### 4.6.1 Potential impact on heritage resources

A total of 12 sites consisting of a combination of buildings and structures were noted on historical topographical maps and aerial imagery. Based on contemporary satellite imagery, five of these sites are associated with surface remains, while seven appear to have been demolished as no surface remains are visible on satellite imagery. Although no surface remains are evident at the demolished sites, subsurface culturally significant



material might still be present. Since these sites are likely to be associated with subsurface culturally sensitive material and buildings and structures exceeding 60 years of age, the sites might be protected by the National Heritage Resources Act (25 of 1999) and should preferably be avoided by the proposed prospecting activities. The 500 m River Buffer is considered potentially sensitive from a heritage perspective and care should be exercised when prospecting within the boundary. A full Phase 1 AIA (Archaeological Impact Assessment) must be done should any development that triggers an AIA result from the prospecting project, including if the cumulative impact of the proposed prospecting exceeds 0.5 ha. If any resource of heritage significance is encountered during prospecting SAHRA should be notified.

#### **4.6.2 Potential impacts on communities, individuals or competing land uses in close proximity**

The prospecting activity will be undertaken in a farming zone.

- Productive sheep and poultry farming, and any prospecting / mining activities will have a negative impact on the farming as the sheep will have to be moved away from the prospecting / mine site with the accompanying loss of grazing. Fewer sheep must be carried on the remaining hectares. The loss of sheep due to possible poaching because of the prospecting / mining must also be taken into consideration

#### **4.6.3 Positive Impacts (Advantage)**

The application is prompted by the fact the geology of the area has shown there are significant deposits as well as coal mines in the area. While no significant short-term positive impacts are associated with the prospecting activities, in the event that a viable reserve is confirmed, and pending the outcome of a detailed social & environmental impact assessments process, positive socio-economic benefits must be investigated and optimized. The section below provides a summary of the key management measures associated with the impacts identified in the previous section. The detailed rating and management plan is presented and measures to manage the potential impact on heritage resources

The fact that the prospecting activities will be undertaken in a phased approach will provide the opportunity to the prospecting team to demarcate areas of cultural and/or heritage significance (such as graves and stone kraals). With the early identification of these the impact on these will be avoided.

#### **Measures to manage the potential impacts on communities, individuals or competing land uses in close proximity**

##### **❖ Pollution Prevention**

Mitigation and management measures must be implemented to prevent environmental pollution which may impact on environmental resources utilized by communities, landowners and other stakeholders. These mitigation and management measures are discussed in the following section.

- ❖ Noise due to the undertaking of the prospecting activities;
  - Directly affected, adjacent landowners and game farms in proximity to the site will be informed of the planned dates of the surveys and a grievance mechanism will be made available.
  - Farms owners must be consulted and informed of any low fly overs which may affect livestock, with a view to prevent possible injury or damage as a result of animals being startled by increased noise.
  - Site activities will be conducted during daytime hours 07h00 – 17h30 to avoid night time noise disturbances and night time collisions with fauna.
  - Poor access control resulting in impacts on cattle movement, breeding and grazing practices;
  - Access control procedures must be agreed on with farm owners and all staff trained on these procedures,
  - Influx of persons (job seekers) to site as a result of increased activity and the possible resultant increase in opportunistic crime;
  - Casual labour will not be recruited at the site to eliminate the incentive for persons travelling to site seeking employment.
  - The landowner (all private and state landowners) will be notified of unauthorised persons encountered on site
  - If deemed necessary, the South African Police Service will be informed of unauthorised persons encountered on site.
  
- ❖ Visual Impact
  - Based on visual observation, wet dust suppression will be undertaken to manage dust emissions from vehicle movement and other construction activities sand when needed
  - Depending on the need and quantity of water used for wet suppression, a suitable, low environmental impact chemical suppression alternative must be considered in order to conserve water resources.
  - The portable ablution facilities, vertical water tanks and any other infrastructure should be acquired with a consideration for colour. Natural earth, green and mat black options which will blend in with the surrounding area must be favoured.
  - A waste management system will be implemented, and sufficient waste bins will be for onsite. A fine system will be implemented to further prohibit littering and poor housekeeping practices.

#### 4.7 Criteria of Assigning Significance to Potential Impacts

##### Assessment Criteria Terminology

The assessment of the impacts has been conducted according to a synthesis of criteria required by the integrated environmental management procedure.

**Table 13: Risk Assessment Terminologies**

TERM	DEFINITION
Nature of impact	This is an appraisal of the type of effect the activity would have on the affected environmental component. Its description should include what is being affected, and how.

Extent	The physical and spatial size of the impact
Duration	The lifetime of the impact which is measured in the context of the lifetime of the proposed phase
Intensity	This describes how destructive, or benign, the impact is. Does it destroy the impacted environment, alter its functioning, or slightly alter it
Probability	This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time.
significance	Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.

**Table 14: Criteria Description**

CRITERIA	DESCRIPTION			
EXTENT	National (4)	Regional (3)	Local (2)	Site (1)
	The whole of South Africa	Provincial and parts of neighbouring provinces	Within a radius of 2 km of the construction site	Within the construction site
DURATION	Permanent (4)	Long-term (3)	Medium-term (2)	Short-term (1)
	Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient	The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter. The only class of impact which will be non-transitory	The impact will last for the period of the construction phase, where after it will be entirely negated	The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase
INTENSITY	Very High (4)	High (3)	Moderate (2)	Low (1)
	Natural, cultural and social functions and processes are altered to extent that they permanently cease	Natural, cultural and social functions and processes are altered to extent that they temporarily cease	Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way	Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected
PROBABILITY OF OCCURRENCE	Definite (4)	Highly Probable (3)	Possible (2)	Improbable (1)

	Impact will certainly occur	Most likely that the impact will occur	The impact may occur	Likelihood of the impact materialising is very low
CRITERIA FOR THE RATING OF CLASSIFIED IMPACTS				
Low impact (3 -10 points)	A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.			
Medium (11 -20 points)	Mitigation is possible with additional design and construction inputs.			
High impact (21 -30 points)	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.			
Very high impact (31 - 48 points)	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a “very high impact” is likely to be a fatal flaw.			
Status	Denotes the perceived effect of the impact on the affected area.			
Positive (+)	Beneficial impact.			
Negative (-)	Deleterious or adverse impact.			
Neutral (/)	Impact is neither beneficial nor adverse.			
It is important to note that the status of an impact is assigned based on the status quo – i.e. should the project not proceed. Therefore not all negative impacts are equally significant.				

#### 4.7.1 Potential Impact of Each Main Activity in Each Phase, and Corresponding Significance Assessment

**Table 15: Significance of the Potential Impacts**

PROSPECTING POTENTIAL IMPACTS							
E = Extent, D = Duration, I = Intensity, P = Probability of occurrence				Where (E + D + I) X P = Significance			
Phase and Activity	Aspect	Potential Impact	Rating Before Mitigation				Significance before mitigation
			E	I	D	P	
Phase I: Mapping & Surveying	Flora	Loss of Vegetation through clearing of the access tracks	1	2	2	3	15 Negative
Phase II -IV: Drilling & Sampling	Flora	Loss of Vegetation when clearing drilling points	1	3	2	2	12 Negative
	Fauna	<ul style="list-style-type: none"> <li>Loss of habitat during clearing of vegetation</li> <li>Potential road kill</li> </ul>	1	5	3	3	27 Negative
	Soil	<ul style="list-style-type: none"> <li>Removal of topsoil on the drilling points</li> <li>Soil disturbance from soil sampling</li> <li>Soil compaction resulting from repeated use of access tracks</li> <li>Oil and fuel spills from drilling equipment</li> </ul>	2	3	2	2	14 Negative
	Water	<ul style="list-style-type: none"> <li>Contamination of ground water and reduction of water quantity through spills of hydrocarbons from drill rig</li> <li>Contamination of surface water through the flow of contaminated storm water from site into local water streams</li> </ul>	1	2	2	2	10 Negative
	Air	Generation of dust from gravel access tracks, and drilling points	1	2	1	2	8 Negative
	Noise	Noise emanating from drill rig	1	1	1	2	6 Negative
Phase II -IV: Access Road	Air	Nuisance dust will be created by the prospecting vehicles to and from site	1	2	1	2	8 Negative



	Fauna	<ul style="list-style-type: none"> <li>Where new temporary tracks will be created the natural habitat of the animals will be destroyed</li> <li>Potential road kills</li> </ul>	2	3	2	3	21 Negative
	Flora	Where new temporary tracks will be created the vegetation will be disturbed and/or destroyed	1	3	2	2	12 Negative
	Surface Water	<ul style="list-style-type: none"> <li>If roads are not properly maintained, water erosion after thunder storms can occur.</li> <li>Possible hydrocarbon spills from equipment and vehicles.</li> </ul>	1	2	2	3	15 Negative
	Soil	<ul style="list-style-type: none"> <li>Compaction of soil is expected on the roads that are used by the prospecting operation.</li> <li>Possible hydrocarbon spills from equipment and vehicles.</li> </ul>	1	2	1	2	8 Negative
	Visual	The temporary tracks will visible to some extent from the immediate surroundings.	1	2	1	2	8 Negative
Phase V: Decommissioning	Air quality	Dust emissions from decommissioning activities (including vehicle entrained dust)	1	2	1	2	8 Negative
	Noise	Noise will be created by the vehicles and equipment in this area.	1	2	1	2	8 Negative
	Soil	<ul style="list-style-type: none"> <li>Soil erosion resulting from the re-spreading of topsoil before vegetation is re-established</li> <li>Ripping of compacted areas</li> </ul>	1	2	1	2	8 Negative
	Surface Water	Possible hydrocarbon spills by vehicles and equipment in this area.	1	2	1	2	8 Negative

#### 4.7.2 Assessment of Potential Cumulative Impacts

Table 16: Significance of Cumulative Impacts

ASPECT	IMPACTS	Impact rating Before Mitigation				Significance before mitigation
		E	I	D	P	
Climate	<ul style="list-style-type: none"> <li>Release of greenhouse gas emissions is expected as a result of land based vehicle activity.</li> <li>The clearing of vegetation negatively affects carbon sequestration efficiency and increase emissions resulting from decomposition. These impacts are regarded as insignificant in terms of contribution. The risks are recognised as a cumulative impact.</li> </ul>	1	1	1	2	6 Negative
Soils	The loss of topsoil as a natural resource as a result of soil contamination and erosion negatively affecting land capability	1	2	1	2	8 Negative
Hydrology	Surface water quality impacts will extend beyond the boundary of the site if not managed appropriately which in turn affects the agricultural sector highly dependent on this surface water resource.	2	2	1	2	10 Negative
Geohydrology	Groundwater contamination is regarded as a cumulative impact. Regionally there is a high dependency on groundwater resources and all activities which may impact on ground water resources are regarded as significant.	1	2	1	2	8 Negative
Biodiversity (Flora, Fauna and Avifauna)	Loss of biodiversity and disruption of existing ecosystem functioning – The cumulative impacts relate to land transformation resulting in the loss of habitat	1	2	1	3	12 Negative
Visual	The cumulative impacts relate to visual disturbance is regarded to impact the regional “sense of place”. Regionally the site visual has been affected by mining and prospecting activities.	1	1	1	2	6 Negative

#### 4.8 Proposed Mitigation Measures to Minimise Adverse Impacts

##### 4.8.1 List of Actions, Activities, or Processes that have Sufficiently Significant Impacts to Require Mitigation

Table 17: Activities requiring Impacts Mitigation

ACTIVITY	IMPACT
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<b>Drilling and sampling</b>	The drilling activity will create significance impact on the biodiversity, underground and surface water and has the potential to generate noise and dust.
<b>Access Road</b>	The clearing of vegetation for access track road to the drilling site and transporting samples from the site for analysis in the lab. The movement of prospecting vehicles would also compact the soils.
<b>Topsoil stockpile</b>	The removed topsoil must be stockpiled for rehabilitation purposes.
<b>Decommissioning and rehabilitation</b>	The decommissioning includes the backfill of the drill sites and pitting sampling points. The potential impacts of this activity include water contamination and generation of dust.

**Table 18: Impact Mitigation**

Aspect	Impact	Mitigation Measures
Air quality	creation of nuisance dust	<ul style="list-style-type: none"> <li>• Avoidance of unnecessary removal of vegetation;</li> <li>• Routine spraying of unpaved site areas and roads</li> <li>• utilized by the prospecting operation with water;</li> <li>• Speed limits of vehicles inside the application area will be strictly controlled to avoid excessive dust or the excessive deterioration of the roads to be used.</li> <li>• All cleared disturbed or exposed areas to be re-vegetated as soon as practically possible to prevent the formation of additional sources of dust.</li> </ul>
Fauna	Loss of Fauna	<ul style="list-style-type: none"> <li>• Speed limits of vehicles inside the application area will be strictly controlled to avoid road kills.</li> <li>• Continuous backfilling of open excavations.</li> <li>• No hunting (snares) will be allowed at the application area.</li> </ul>
Flora	Loss of Flora	<ul style="list-style-type: none"> <li>• No trees or shrubs will be felled or damaged for the purpose of obtaining firewood.</li> <li>• Management will take responsibility to control declared invader or exotic species on the site. The following control methods will be used: <ul style="list-style-type: none"> <li>➤ "The plants will be uprooted, felled or cut off and can be destroyed completely."</li> <li>➤ "The plants will be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such an herbicide."</li> </ul> </li> </ul>
		<ul style="list-style-type: none"> <li>• Continuous backfilling of open excavations and spreading of previously stored topsoil over the rehabilitated areas.</li> <li>• All rehabilitated areas, where applicable and possible, will be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to prospecting activities commenced, if the natural succession of vegetation is unacceptably slow.</li> <li>• The end objective of the re-vegetation program will be to achieve a stable self-sustaining habitat unit</li> </ul>

Groundwater	Contamination of groundwater	<ul style="list-style-type: none"> <li>• Vehicle- and equipment maintenance will only be allowed within the maintenance area. Only emergency breakdowns will be allowed in other areas.</li> <li>• The following procedure will be followed if a vehicle or piece of equipment would break down inside an excavation and outside of the maintenance area:</li> <li>• Drip pans will be placed at all points where diesel, oil or hydraulic fluid may drip and in so doing contaminate the soil.</li> <li>• All efforts will be made to move the broken down vehicle or piece of equipment to the maintenance area.</li> <li>• If the vehicle/piece of equipment cannot be moved, the broken part will firstly be drained of all fluid. The part will then be removed and taken to the maintenance area.</li> <li>• Equipment used as part of the proposed operation will be adequately maintained so as to ensure that oil, diesel, grease or hydraulic fluid does not leak during operation.</li> <li>• Fuel and other petrochemicals will be stored in steel receptacles that comply with SANS 10089-1:2003 (SABS 089-1:2003) standards. An adequate bund wall, 150% of volume of the largest storage receptacle, will be provided for fuel and diesel areas to accommodate any spillage or overflow of these substances. The area inside the bund wall will be lined with an impervious lining to prevent infiltration of the fuel into the soil (and ultimately groundwater). The latter will be covered by an approved bacterial hydrocarbon digestion agent that is effective in water.</li> </ul>
Noise	Generation of Noise from prospecting equipment and vehicles	<ul style="list-style-type: none"> <li>• Working hours will be kept between sunrise and sunset as far as possible.</li> <li>• The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the plant area and that which may migrate outside the plant area.</li> <li>• Hearing protection will be available for all employees where attenuation cannot be implemented.</li> <li>• If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.</li> </ul>
Soil	Contamination of soil	<ul style="list-style-type: none"> <li>• In all places of development the first 300mm of loose or weathered material found will be classified as a growth medium. The topsoil will be removed, where possible, from all areas where physical disturbance of the surface will occur.</li> <li>• In all areas where the above growth medium will be impacted on, it will be removed and stockpiled on a dedicated area. The maximum height of stockpiles will be 2 meters</li> <li>• The growth medium/topsoil will be used during the rehabilitation of any impacted areas, after sloping in order to re-establish the same land capability.</li> </ul>



		<ul style="list-style-type: none"> <li>• If any soil is contaminated during the life of the prospecting period, it will either be treated on site or be removed together with the contaminant and placed in acceptable containers to be removed with the industrial waste to a recognized facility or company.</li> <li>• Erosion control in the form of re-vegetation and contouring of slopes will be implemented on disturbed areas in and around the site.</li> <li>• Topsoil will be kept separate from overburden and will not be used for building or maintenance of access roads.</li> <li>• The stored topsoil will be adequately protected from being blown away or being eroded.</li> <li>• Compacted areas will be ripped to a depth of 300mm, where possible, during the continuous rehabilitation, decommissioning and closure phases of the operation in order to establish a growth medium for vegetation.</li> <li>• Vehicle movement will be confined to established roads for as far as practical in order to prevent the compaction of soils.</li> </ul>
Surface water	Contamination of surface water	<ul style="list-style-type: none"> <li>• All non-biodegradable (recyclable) refuse such as glass bottles, plastic bags and metal scrap will be stored in a container in the waste area and collected on a regular basis and disposed of at a recognized disposal facility.</li> <li>• Erosion and storm water control measures will be implemented.</li> <li>• During rehabilitation the applicant will endeavour to reconstruct flow patterns in such a way that surface water flow is in accordance with the natural drainage of the area as far as practically possible.</li> </ul>
Topography	Alteration of slopes	<ul style="list-style-type: none"> <li>• All open excavations will be backfilled if and when possible and made safe so as to reflect as far as possible the pre-prospecting topography of the area.</li> <li>• All temporary features, e.g. plant, containers and stockpiling, will be removed and handled in the prescribed manner during rehabilitation.</li> </ul>
Visual	Creation of an unpleasing visual look inland and site from offshore	<ul style="list-style-type: none"> <li>• Open excavations will be subject to progressive backfilling and made safe (including the reestablishment of vegetation).</li> <li>• Waste material of any description will be removed from the prospecting area upon completion of the operation and be disposed of at a recognized landfill facility.</li> </ul>

**Table 19: Significance of Impact after Mitigation**

Phase and Activity	Aspect	Potential Impact	Significance before mitigation	Significance After Mitigation
Phase I: Mapping & Surveying	Flora	Loss of Vegetation through clearing of the access tracks	15 Negative	3 Negative
Phase II -IV: Drilling & Sampling	Flora	Loss of Vegetation when clearing drilling points	12 Negative	6 Negative
	Fauna	<ul style="list-style-type: none"> <li>Loss of habitat during clearing of vegetation</li> <li>Potential road kill</li> </ul>	21 Negative	10 Negative
	Soil	<ul style="list-style-type: none"> <li>Removal of topsoil on the drilling points</li> <li>Soil disturbance from soil sampling</li> <li>Soil compaction resulting from repeated use of access tracks</li> <li>Oil and fuel spills from drilling equipment</li> </ul>	14 Negative	8 Negative
	Water	<ul style="list-style-type: none"> <li>Contamination of ground water and reduction of water quantity through spills of hydrocarbons from drill rig</li> <li>Contamination of surface water through the flow of contaminated storm water from site into local water streams</li> </ul>	10 Negative	3 Negative
	Air	Generation of dust from gravel access tracks, and drilling points	8 Negative	3 Negative
	Noise	Noise emanating from drill rig	6 Negative	3 Negative
Phase II -IV: new temporary tracks	Air	Nuisance dust will be created by the prospecting vehicles to and from site	8 Negative	3 Negative
	Fauna	<ul style="list-style-type: none"> <li>Where new temporary tracks will be created the natural habitat of the animals will be destroyed</li> <li>Potential road kills</li> </ul>	12	4

			Negative	Negative
	Flora	Where new temporary tracks will be created the vegetation will be disturbed and/or destroyed	21 Negative	10 Negative
	Surface Water	<ul style="list-style-type: none"> <li>If roads are not properly maintained, water erosion after thunder storms can occur.</li> <li>Possible hydrocarbon spills from equipment and vehicles.</li> </ul>	15 Negative	4 Negative
	Soil	<ul style="list-style-type: none"> <li>Compaction of soil is expected on the roads that are used by the prospecting operation.</li> <li>Possible hydrocarbon spills from equipment and vehicles.</li> </ul>	8 Negative	3 Negative
	Visual	The temporary tracks will visible to some extent from the immediate surroundings.	8 Negative	3 Negative
Phase V: Decommissioning	Air quality	Dust emissions from decommissioning activities (including vehicle entrained dust)	8 Negative	3 Negative
	Noise	Noise will be created by the vehicles and equipment in this area.	8 Negative	5 Negative
	Soil	<ul style="list-style-type: none"> <li>Soil erosion resulting from the re-spreading of topsoil before vegetation is re-established</li> <li>Ripping of compacted areas</li> </ul>	8 Negative	3 Negative
	Surface Water	Possible hydrocarbon spills by vehicles and equipment in this area.	8 Negative	4 Negative

## 5 ENVIRONMENTAL IMPACT STATEMENT

### 5.1 Summary of the key findings of the environmental impact assessment

#### 5.1.1 ASSESSMENT OF LIKELY IMPACTS

Vegetation disturbance through compaction and trampling; Increased dust.

Noise pollution during exploration: and

Introduction and spread of declared weeds and alien invasive plants: This may occur in disturbed areas and/or where propagules of these plants are readily available.

##### 5.1.1.1 Biodiversity Impact Assessment

Impacts on the vegetation in the study areas are assessed for the clearing of vegetation of small areas of vegetation (each less than 10 m<sup>2</sup>) where prospecting samples would be obtained. The movement of drilling machinery could cause some damage to the vegetation, but this could be mitigated by careful planning. Routes through the vegetation to the drilling sites should be predetermined on foot and the most open routes selected. Such routes would cause least damage.

The 'No Go' alternative is also assessed.

##### 5.1.1.2 'No Go' Alternative

In the case of the **"No Go" alternative** where there would be no change to the *status quo*. The land would remain as is with no prospecting and the natural vegetation would persist. Depending on the future use of the properties for grazing, the 'no development' alternative or 'No Go' alternative could have further negative impacts (dependent on stocking rates) on the natural vegetation, but the magnitude of that potential impact is difficult to predict. The 'No Go' alternative is included.

##### 5.1.1.3 Direct Impacts

Localized geological / soil samples would be obtained during prospecting, and in some cases, drilling would be required to obtain required subsoil samples. The impacts would thus be at the sampling / drilling sites and from the movement of vehicles and machinery over the site, there would be no 'Operational Phase'. The latter would only be applicable should the area be mined at some future date.

#### 5.1.1.3.1 Impact Assessment and Mitigations

Impact Phase: Exploration							
<b>Potential impact description:</b> Impacts on watercourses The major impact during this phase may result from infilling and impediment of watercourses if drilling occurs near the river banks.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	H	M	Negative	M	H	H
With Mitigation	L	M	L	Negative	M	M	H
Can the impact be reversed?		Yes, Watercourses can be rehabilitated.					
Will impact cause irreplaceable loss of resources?		No.					
Can impact be avoided, managed or mitigated?		Yes. All watercourses should be avoided.					
Mitigation measures: <ul style="list-style-type: none"><li>No drilling is to be allowed within 100 m of all watercourses.</li></ul>							



Impact Phase: Exploration							
<b>Potential impact description:</b> Introduction of alien invasive plants Cleared areas which are not rehabilitated are likely to be invaded by aliens and pioneer plants.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	H	M	Negative	M	H	H
With Mitigation	L	L	L	Negative	L	L	H
Can the impact be reversed?		This impact can be prevented through appropriate mitigation measures such as eradication.					
Will impact cause irreplaceable loss of resources?		No. If this impact is correctly addressed, then no loss of resources will occur.					
Can impact be avoided, managed or mitigated?		Yes. This impact can be avoided if appropriate mitigation measures are followed.					
Mitigation measures: <ul style="list-style-type: none"><li>Any cleared areas that are no longer or not required for drilling activities should be re-seeded with locally sourced seed of suitable species. Bare areas can also be packed with brush removed from other parts of the site to encourage natural vegetation regeneration and limit erosion.</li></ul>							

Impact Phase: Exploration							
<b>Potential impact description:</b> Direct and indirect avifauna and faunal Impacts							
The exploration phase will result in habitat loss, noise and disturbance on site. This will lead to direct and indirect disturbance of fauna. Slow-moving species such as the tortoises are likely to be killed by machinery.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	L	M	Negative	M	H	H
With Mitigation	L	L	M	Negative	M	M	H
Can the impact be reversed?		Yes, This impact can be prevented through appropriate mitigation measures.					
Will impact cause irreplaceable loss of resources?		No. No Species of Conservation Concern are likely to be impacted by the activities.					
Can impact be avoided, managed or mitigated?		Yes. Contractors should be informed about slow moving species that are likely to be crushed by construction vehicles.					
Mitigation measures:							
<ul style="list-style-type: none"><li>No animal may be hunted, trapped, snared or captured for any purpose whatsoever.</li><li>Speed of vehicles should be limited to allow for sufficient safety margins.</li></ul>							

Impact Phase: Exploration							
<b>Potential impact description:</b> Impacts on vegetation							
The major impact during this phase will result from vegetation clearance for drilling purposes							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	H	M	Negative	M	H	H
With Mitigation	L	H	M	Negative	M	M	H
Can the impact be reversed?		No, once vegetation is cleared, it would not be possible to return it to its previous state.					
Will impact cause irreplaceable loss of resources?		No. The site has already been exposed to severe modifications. There is minimal intact vegetation remaining.					
Can impact be avoided, managed or mitigated?		No. Although mitigations will be provided, vegetation loss would be inevitable.					
Mitigation measures:							
<ul style="list-style-type: none"><li>All natural vegetation not required to be removed should be protected against damage.</li></ul>							

#### 5.1.1.3.1.1 Rehabilitation

The traditional definition of rehabilitation aims at returning the land in a given area to some degree of its former state after a particular process has resulted in its damage.

Rehabilitation requires that there is an attempt to imitate natural processes and reinstate natural ecological driving forces in such a way that it aids the recovery (or maintenance) of dynamic systems so that, although they are unlikely to be identical to their natural counterparts, they will be comparable in critical ways so as to function similarly (Jordan et al.1987). Rehabilitation should be based on an understanding of both the ecological starting point and on a defined goal endpoint and should accept that it is not possible to predict exactly how the disturbed vegetation is likely to respond to the rehabilitation interventions.

During this exploration phase, all disturbed areas should be rehabilitated. This should be done using indigenous vegetation.

#### 5.1.1.4 Aquatic Identified Impacts (Wetland and River)

Aquatic ecosystems are particularly vulnerable to human activities and these activities can often result in irreversible damage or longer term, cumulative changes. The significance of an impact to the environment or ecosystem can only be assessed in terms of the change to ecosystem services, resources and biodiversity value associated with that system or component being assessed. The approach adopted is to identify and predict all potential direct and indirect impacts resulting from an activity from planning to rehabilitation. Thereafter, the impact significance is determined. Impact significance is defined broadly as a measure of the desirability, importance and acceptability of an impact to society (Lawrence, 2007). The degree of significance

depends upon three dimensions: the measurable characteristics of the impact (e.g. intensity, extent and duration), the importance societies/communities place on the impact, and the likelihood / probability of the impact occurring. The indirect impacts associated with the project are grouped into three encapsulating impact categories where associated or interlinked impacts are grouped. The potential impacts are described below.

#### 5.1.1.4.1 Disturbance of aquatic vegetation and habitat

The disturbance or loss of aquatic vegetation and habitat refers to the physical destruction or disturbance of aquatic habitat caused by vegetation clearing, disturbance of habitat, encroachment and colonisation of habitat by invasive alien plants.

Direct impacts upon aquatic vegetation and habitat from prospecting are highly unlikely to occur as no aquatic habitat was identified within the focus areas. However, if the prospecting activities encroach into any surrounding aquatic habitat then the vegetation may be disturbed through machinery and workers clearing/trampling the access tracks or from clearing at the drilling points.

The disturbance to soil and vegetation from drilling activities within the wetland and river catchments has potential to indirectly impact the systems through increased sediment inputs from soil movement in areas of bare ground. Wind-blown sediments or sand carried by surface runoff into the wetlands from the drilling points can bury aquatic biota. Prospecting can promote the establishment of disturbance-tolerant species, including colonisation by invasive alien species, weeds and pioneer plants. Ultimately, changes to land cover within catchments can indirectly affect watercourses. The proposed prospecting will however cause very minor changes to the catchment. These indirect impacts are not going to have significant effects upon the identified habitats as the activities are temporary, have a small disturbance footprint, and are located outside of the focus sites.

#### 5.1.1.4.2 Sedimentation and erosion

Sedimentation and erosion refers to the alteration in the physical characteristics of watercourses as a result of increased turbidity and sediment deposition, caused by soil erosion and earthworks, as well as instability and collapse of unstable soils in the long-term. These impacts can result in the deterioration of aquatic ecosystem integrity and a reduction/loss of habitat for aquatic dependent flora & fauna.

The project will not cause any physical alterations to the aquatic habitats but there may be minor indirect impacts. Vegetation clearing, drilling, backfilling, stockpiling and exposure of bare soils decreases the soil binding capacity and cohesion of the upslope soils and thus increase the risk of erosion and sedimentation downslope. This may cause the burying of aquatic habitat and also cause aquatic faunal fatalities if in close proximity or on a steeper slope. Drilling could initiate localised erosion if the sites are not backfilled and rehabilitated. Formation of rills and gullies from altered runoff patterns can occur. These impacts can be magnified should work coincide with a high rainfall event that is not appropriately planned for. Although the

drilling activities will be temporary and over a short time period, erosion initiated by drilling can increase over time. Due to the very small footprint disturbed for prospecting and minor amount of soil movement required, impacts upon aquatic biodiversity from erosion and sedimentation are improbable for this project.

#### 5.1.1.4.3 Water Pollution

Water and/or soil pollution cause negative changes in the physical, chemical and biological characteristics of water resources (i.e. water quality). These alterations impact the species composition of the systems, especially species sensitive to minor changes in these parameters. Sudden drastic changes in water quality can also have chronic effects on aquatic biota. This can result in possible deterioration in aquatic ecosystem integrity and a reduction in, or loss of species of conservation concern (i.e. rare, threatened/endangered species). The incorrect positioning and maintenance of the portable chemical toilets and use of the surrounding environment as ablution facilities may result in sewage and chemicals entering the systems. Hydrocarbons including petrol/diesel and oils/grease/lubricants associated with machinery may potentially enter the systems by means of surface runoff or through dumping by workers.

#### 5.1.1.4.4 IMPACT SIGNIFICANCE

The assessment of impacts 'with mitigation' is considered as the best case scenario and assumes that all of the mitigation measures within this report and the EMPr will be successfully implemented. The 'with mitigation' scenario includes the adoption of the recommended buffer areas detailed in the following section. However, assessment under the category 'without mitigation' measures assumes a worst case scenario involving the poor implementation of mitigation, bare minimum incorporation of recommended buffers, poor operational maintenance, and poor onsite rehabilitation. The No-Go alternative of maintaining the status quo has no impacts associated with it.

The impacts associated with the project are of Low significance; however, the impacts can be entirely avoided with the implementation of effective mitigation measures and buffer zones.

#### 5.1.1.5 PROPOSED MITIGATION

##### 5.1.1.5.1 Aquatic Mitigation

The landscape where the prospecting operation would be carried out is not fragile. Apart from the fact that the area experiences very low average annual precipitation, it is still feasible to allow the disturbed areas to re-vegetate naturally, without any intervention except mulching. Introduction of any plant species not already found on the sites is discouraged. This is particularly so in the case of rehabilitation using grasses. If grasses are used, the sheep on the site would preferentially graze these plants and would cause further disturbance which would not be desirable.

Mitigation measures related to the impacts associated with the prospecting activities are intended to augment standard/generic mitigation measures included in the project-specific Environmental Management Programme (EMPr).

Monitoring of the prospecting activities is essential to ensure the mitigation measures are implemented. Compliance with the mitigation recommendations must be audited by a suitably qualified independent Environmental Control Officer with an appropriately timed audit report. In the case where there is extensive damage to any aquatic system, where rehabilitation is required, a suitably qualified aquatic specialist must audit the site. Monitoring for non-compliance must be done on a daily basis by the contractors. Photographic records of all incidents and non-compliances must be retained. This is to ensure that the impacts on the aquatic habitat are avoided and mitigated against.

The following mitigation measures must be adhered to and monitored:

- The aquatic habitats identified within the study area must be treated as 'No Go' Areas in that there is to be no intrusion into any surface water resource.
- Where necessary, such as near the small depression, the aquatic buffer zone must be demarcated to ensure that site workers do not enter sensitive habitat.
- Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils.
- Prevent any potential sources of pollution from entering the surrounding environment (e.g. litter, hydrocarbons from vehicles & machinery, etc.). Any solid domestic waste must be removed and disposed of offsite.
- Appropriate ablution facilities should be provided for workers on-site during prospecting.
- Drilling must be immediately followed by rehabilitation.
- Any erosional features caused by the activities within or surrounding the watercourses must be stabilised to ensure that no further erosion occurs from surface runoff.
- Where necessary, the establishment of indigenous vegetation cover to stabilise soils should be undertaken.
- Rehabilitation must, as near as possible, return the landscape topographical profile to pre-disturbance form, without unnatural humps or hollows.
- A monitoring programme shall be in place, not only to ensure compliance with the EMPr throughout the drilling phase, but also to monitor any post-drilling environmental issues and impacts.

The direct and indirect impacts associated with the project were identified and grouped into three encapsulating impact categories. The indirect impacts identified are:

- The disturbance or loss of aquatic vegetation and habitat
- Sedimentation and erosion
- Water pollution

The impacts associated with the project are of Low significance; however, the impacts can be entirely avoided with the implementation of effective mitigation measures and buffer zones. The adoption of a to.



#### 5.1.1.5.2 Palaeontology Conclusions and Recommendations

The following recommendations are made in order to avoid the destruction of heritage remains within the area demarcated for prospecting:

- Although the 7 demolished sites dating to 1939 and 1961 appear not to be associated with surface remains, subsurface culturally significant material might be present (Sites K01 – K03, K05, K06, K08, K11). Therefore, it is recommended that these areas be avoided by the proposed prospecting activities.
- The five sites associated with surface remains might date to 1939 and 1961 (K04, K07, K09, K10, K12). The possibility therefore exists that the associated buildings and structures exceed 60 years of age. It is therefore recommended that these areas be avoided by the proposed prospecting activities.
- The remaining buildings and infrastructure associated with the demarcated study area appear to be of contemporary origin and are therefore not regarded to be significant from a heritage perspective.
- The 500 m buffer zone surrounding the non-perennial stream is potentially sensitive from a heritage perspective. Care should be exercised when prospecting within this boundary.
- Except for the sites falling within the area associated with current/historical cultivation, this area is less sensitive from a heritage perspective. It is therefore recommended that this area be considered when deciding on prospecting locations.
- It should also be noted that the identified sites can only be rated once inspected.
- It is advised that a qualified archaeologist be contacted whenever uncertainty regarding potential heritage remains exists.
- Prospecting should not take place in the vicinity of stone cairns, potential burial sites, stone-walling, building ruins or any other heritage material or structures.
- Should the prospecting outcome result in further development or construction, a full Phase 1 Archaeological Impact Assessment must be conducted on the affected area if triggered. Also, a full Phase 1 AIA must be done should the cumulative impact of the proposed prospecting exceed 0.5 ha.
- Because archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the prospecting phase, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed, all activities must be suspended and the relevant heritage resources authority contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).
- From a heritage point of view, prospecting may proceed on the demarcated portions, subject to the abovementioned conditions and recommendations.

#### 5.1.1.6 PROPOSED REHABILITATION

- All augur and drill holes must be closed up once finished so that small animals cannot fall into them.
- All sample holes must have sloped edges at an angle of not more than 40 degrees so that they do not act as traps for small animals (such as tortoises).

The criteria for the description and assessment of environmental impacts were drawn from the Guidelines for EIA Regulations National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"). Document still provides good guidance for conducting impact assessments.

Activities to be undertaken in proposed development and its respective construction and operational phases, give rise to certain impacts. For the purpose of assessing these impacts, the project has been divided into two phases from which impacting activities can be identified, namely:

a) Construction phase:

All the construction related activities on site, until the contractor leaves the site.

b) Operational phase:

All activities, including the operation and maintenance of the proposed prospecting.

The activities arising from each of these phases have been included in the tables. This is to identify activities that require certain environmental management actions to mitigate the impacts arising from them. The criteria against which the activities were assessed are given in the next section.

## 5.2 Assessment Criteria

The assessment of the impacts has been conducted according to a synthesis of criteria required by the integrated environmental management procedure.

### 5.2.1 Extent

The physical and spatial scale of the impact is classified as:

a) Footprint

The impacted area extends only as far as the activity, such as footprint occurring within the total site area.

b) Site

The impact could affect the whole, or a significant portion of the site.

c) Regional

The impact could affect the area including the neighbouring properties, the transport routes and the adjoining towns.

d) National

The impact could have an effect that expands throughout the country (South Africa).

e) International

Where the impact has international ramifications that extent beyond the boundaries of South Africa.

### 5.2.2 Duration

The lifetime of the impact, that is measured in relation to the lifetime of the proposed development.

a) Short term

The impact would either disappear with mitigation or will be mitigated through natural processes in a period shorter than that of the construction phase.

b) Short to Medium term

The impact will be relevant through to the end of the construction phase.

c) Medium term

The impact will last up to the end of the development phases, where after it will be entirely negated.

d) Long term

The impact will continue or last for the entire operational life time of the development, but will be mitigated by direct human action or by natural processes thereafter.

e) Permanent

This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient,

### 5.2.3 Intensity

The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself. The intensity is rated as:

a) Low

The impact alters the affected environment in such a way that the natural processes or functions are not affected.

b) Medium

The affected environment is altered, but functions and processes continue, albeit in a modified way.

c) High

Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

#### **5.2.4 Probability**

This describes the likelihood of the impacts actually occurring. The impact may occur for any length during the life cycle of the activity, and not at any given time. The classes are rated as follows:

a) Impossible

The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0%).

b) Possible

The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined as 25%.

c) Likely

There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined as 50%.

d) Highly likely

It is most likely that the impacts will occur at some stage of the prospecting. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75%.

e) Definite

The impacts will take place regardless of any provisional plans, and or mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100%.

#### **5.2.5 Mitigation**

The impacts that are generated by the prospecting can be minimised if measures are implemented in order to reduce the impacts. The mitigation measures ensure that the development considers the environment and the predicted impacts in order to minimise impacts and achieve sustainable development.

### **5.3 Determination of significance – Without Mitigation**

Significance is determined through a synthesis of impacts as described in the above paragraphs. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact “without mitigation” is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, significance is noted as “positive”. Significance is rated on the following scale:

a) No significance

The impact is not substantial and does not require any mitigation action.

b) Low

The impact is of little importance, but may require limited mitigation.

c) Medium

The impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.

d) High

The impact is of major importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

#### **5.4 Determination of significance – With Mitigation**

Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. Significance with mitigation is rated on the following scale:

a) No significance

The impact will be mitigated to the point where it is regarded as insubstantial.

b) Low

The impact will be mitigated to the point where it is of limited importance.

c) Low to Medium

The impact is of importance however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels.



d) Medium

Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.

e) Medium to High

The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels.

f) High

The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.

## **5.5 Assessment weighting**

Each aspect within the impact description was assigned a series of quantitative criteria. Such criteria are likely to differ during the different stages of the project's life cycle. In order to establish a defined base upon which it becomes feasible to make an informed decision, it is necessary to weigh and rank all criteria.

## **5.6 Ranking, Weighting and Scaling**

For each impact under scrutiny, a scale weighting Factor is attached to each respective impact (Refer to Figure 39: Description of biophysical assessment parameters with its respective weighting), The purpose of assigning such weight serve to highlight those aspects considered most critical to the various stakeholders and ensure that each specialist's element of bias is taken into account. The weighting factor also provides a means whereby the impact assessor can successfully deal with the complexities that exist between the different impacts and associated aspects criteria.

Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance.

ICA	Extent	Duration	Intensity	Probability	Weighting Factor (WF)	Significance Rating (SR)	Mitigation Efficiency (ME)	Significance Following Mitigation (SFM)
Footprint	1	Short term	Low	Probable	Low	Low	High	Low
	1	1	1	1	1	0-19	0,2	0-19
Site	2	Short to medium		Possible	Low to medium	Low to medium	Medium to high	Low to medium
	2	2		2	2	20-39	0,4	20-39
Regional	3	Medium term	Medium	Likely	Medium	Medium	Medium	Medium
	3	3	3	3	3	40-59	0,6	40-59
National	4	Long term		Highly Likely	Medium to high	Medium to high	Low to medium	Medium to high
	4	4		4	4	60-79	0,8	60-79
International	5	Permanent	High	Definite	High	High	Low	High
	5	5	5	5	5	80-100	1,0	80-100

Figure 39: Description of biophysical assessment parameters with its respective weighting

### 5.6.1 Identifying the Potential Impacts Without Mitigation (WOM)

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned weightings, resulting in a value for each impact (prior to the implementation of mitigation measures).

Equation 1:

Significance Rating (WOM) = (Extent + Intensity + Duration + Probability) x Weighting Factor

### 5.6.2 Identifying the Potential Impacts With Measures (WM)

In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it was necessary to re-evaluate the impact.

#### Mitigation Efficiency (ME)

The most effective means of deriving a quantitative value of mitigated impacts is to assign each significance rating value (WOM) a mitigation effectiveness (ME) rating. The allocation of such a rating is a measure of the efficiency and effectiveness, as identified through professional experience and empirical evidence of how effectively the proposed mitigation measures will manage the impact.

Thus, the lower the assigned value the greater the effectiveness of the proposed mitigation measures and subsequently, the lower the impacts with mitigation.

Equation 2:

Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency

or WM = WOM x ME

Significance Following Mitigation (SFM)

The significance of the impact after the mitigation measures are taken into consideration. The efficiency of the mitigation measure determines the significance of the impact. The level of impact is therefore seen in its entirety with all considerations taken into account.

The key environmental issues listed in the following section have been determined through:

- Views of Interested and Affected Parties;
- Comments to be received from commenting authorities;
- Legislation; and
- Experience of the Environmental Assessment Practitioner (EAP).

## **5.7 Summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;**

Increased ambient noise levels resulting from increased traffic movement during all prospecting phases as well as drilling activities.

Potential water and soil pollution impacts resulting from hydrocarbon spills and soil erosion which may impact on environmental resources utilized by communities, landowners and other stakeholders.

Potential water and soil pollution impacts resulting from hydrocarbon spills and soil erosion which may impact on ecosystem functioning.

Increased vehicle activity within the area resulting in the possible destruction and disturbance of fauna and flora.

Poor access control to farms which may impact on cattle movement, breeding and grazing practices.

Influx of persons (job seekers) to site as a result of increased activity and the possible resultant increase in opportunistic crime.

Potential visual impacts caused by drilling activities. Prospecting will be undertaken by specialist sub - contractors and it is not anticipated that employment opportunities for local and / or regional communities will result from the prospecting activities.

### **Potential impacts per activity and listed activities.**

#### **5.7.1 Construction Phase**

- Generation of fugitive dust
- Removal of existing vegetation
- Potential negative impact on topsoil seed bank if not stockpiled correctly.

#### **5.7.2 Drilling and sampling**

- Generation of fugitive dust

- Potential hydrocarbon spillage through leaking equipment
- Preparation of vehicle maintenance concrete padding
- Fugitive dust generation
- Spillage of carbonaceous material on roads or other areas

### **5.7.3 Decommissioning and Closure Phases**

- Fugitive dust generation
- Mixing of sub soils with topsoil
- Poor compaction

## **5.8 Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr;**

The objectives of the EMPr will be to:

- Provide sufficient information to strategically plan the prospecting activities as to avoid unnecessary social and environmental impacts.
- Provide sufficient information and guidance to plan prospecting activities in a manner that would reduce impacts (both social and environmental) as far as practically possible.
- Ensure an approach that will provide the necessary confidence in terms of environmental compliance
- Provide a management plan that is effective and practical for implementation.

Through the implementation of the proposed mitigation measures, it is anticipated that the identified social & environmental Impacts can be managed and mitigated effectively. Through the implementation of the mitigation and management measures it is expected that:

- Noise impacts can be managed through consultation and through the restriction of operating hours;
- The pollution of soil and water resources can be effectively managed through containment;
- Ecological impact can be managed through the implementation of pollution prevention measures, minimizing land clearing, restricting working hours (faunal disturbance) and rehabilitation.
- Risks associated with crime can be mitigated through avoiding recruitment activities on site, as well as monitoring and reporting.

### **5.8.1 Aspects for inclusion as conditions of Authorisation.**

Any aspects which must be made conditions of the Environmental Authorisation

Granting of the prospecting right in conjunction with the environmental authorisation.

### **5.8.2 Description of any assumptions, uncertainties and gaps in knowledge.**

(Which relate to the assessment and mitigation measures proposed)

As is standard practice, this Basic Assessment Report is based on a number of assumptions and is subject to certain limitations. These are as follows:

- It is assumed that information provided by the applicant and related studies is accurate;

This assessment is based largely on our understanding of the physical and ecological setting based on available literature and based on information that has been gathered in the project area.

The public consultation process will include all invited IAP's from the neighbouring areas, those that responded to the advertisement and the land owner. Comment on all aspects of the process was welcomed during the consultation including comment on the description of the environment. Comments or concerns regarding the description of the environment was raised during public consultation. Notwithstanding the above, Archean is confident that these assumptions and limitations do not compromise the overall findings of this report.

### **5.8.3 Reasoned opinion as to whether the proposed activity should or should not be authorised**

#### **i) Reasons why the activity should be authorized or not.**

Section 12 of the MPRDA 2002 states "The holder of a permit or authorization remains liable for complying with the relevant provisions of the Act until the Regional Director has issued to him a certificate to the effect that he has complied with the said provisions" The EAP is under the opinion that the applicant has complied with these provisions.

The risks that have been identified can be mitigated. A bank guarantee has provided, indicating that provision has been made for the rehabilitation and removal of species in the proposed area.

### **5.8.4 Conditions that must be included in the authorisation**

- As there are existing roads on the site, no new roads will be constructed without prior NEMA approval/.
- Only all-wheel-drive vehicles may be used; this substantially reduces the impact of vehicles on the terrain.
- Prospecting should only be allowed in the dry season, when most of the plants are dormant or below ground, and when the ground is harder and less prone to erosion.
- Any excavated soils not needed for sampling must be replaced within one day of excavation, with topsoil kept aside and replaced last. The top 50cm (500mm) of any hole should be regarded as topsoil.
- Employees and all prospecting contractors must be informed about the importance and sensitivity of the natural vegetation prior to entering the area, and thereafter on an ongoing basis. The following topics should be presented to them: minimising disturbance, avoidance of disturbance in non-target areas, erosion control, litter management, use of dedicated on site toilets, protection of all fauna and flora.

- Where possible all disturbed and displaced succulents and bulbs (where evident after drilling) should be replanted by hand within the disturbed areas, and the soil compacted by hand around their roots or bulbs..
- Whilst these mitigation measures will lessen the potential negative impacts on the vegetation, they will not entirely mitigate the damage that will be done. Of particular importance is the method of filling holes and replacing topsoil - this must be done concurrently with the drilling process i.e. holes should be filled and rehabilitated almost immediately after sampling is done at each site. It is also imperative that prospecting paths are driven only once. Photographic records of each site pre- and post- drilling should be kept as proof of adequate rehabilitation.

#### **5.8.5 Period for which the Environmental Authorisation is required.**

The Prospecting Right has been applied for a period of five years. The Environmental Authorisation must be valid for the term of the prospecting right and until the closure certificate has been received by the applicant.

#### **5.8.6 Undertaking**

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic assessment report and the Environmental Management Programme report.

The EAP confirms that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic Assessment report and the Environmental Management Programme report.

### **5.9 Financial Provision**

State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation. The applicant must make financial provision for the rehabilitation of the environmental has been calculated at **R 137 493.**

#### **5.9.1 Explain how the aforesaid amount was derived.**

The financial provision was calculated based on the current master rates in the quantum table noting the area that will be disturbed by the drilling and pitting and vehicle movement.

Refer to section:**Determination of the amount of Financial Provision..** The applicant is further required to make a determination of the financial provision which must include cost for premature mission and financial closure and post closure management of the environmental impacts.

#### **5.9.2 Confirm that this amount can be provided for from operating expenditure.**



It is hereby undertaken that the amount of **R 137 493**. in the form of a bank guarantee for rehabilitation purposes as required in terms the NEMA and MPRDA acts, will be provided to the DMR upon granting of the requested prospecting right.

### **5.9.3 Specific Information required by the competent Authority**

- ii) Compliance with the provisions of sections 24(4)(a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998). the EIA report must include the:-**

**(1) Impact on the socio-economic conditions of any directly affected person.**

No specific socio-economic report was generated however comments from affected landowners have been highlighted and taken into consideration:

- The directly and indirectly affected property owners living near the project are likely to be affected by issues relating to noise, dust and vibration from prospecting operations. Directly affected property owners may also be affected by visual disturbances including night lights and infrastructure. Affected property owners also noted a number of concerns including:
  - Impacts on feelings of safety and security.
  - Changes to local amenity.
  - Impacts of dust.
  - Quality of lifestyles as a result of noise and dust.

### **Mitigation**

Isowel Tech Solutions will monitor impacts on affected property owners and their environment and conduct regular dialogue and consultation to identify and manage any adverse impacts. Pro-active monitoring would also assist to determine potential issues before property owners are affected.

### **5.9.4 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act.**

Consultation with the landowner regarding grave sites and cultural interest on the site will be done prior to drilling, thus activities of will not result on any historical resources being impacted on.

### **5.9.5 Other matters required in terms of sections 24(4)(a) and (b) of the Act.**

No alternative area has been considered in terms of the application area and minerals due to the potential resources normally associated with the geology.

## **PART B**

### **6 ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT**

#### **6.1 Draft environmental management programme.**

- a) **Details of the EAP**, (Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required).

Description of proposed activity has been provided in PART A, of this document

#### **6.2 Description of the Aspects of the Activity (Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required).**

Description of proposed activity has been provided in PART A, of this document

#### **6.3 Composite Map**

##### **6.3.1.1 Aquatic Buffer Zones**

Aquatic buffer zones are designed to act as barriers between human activities and sensitive water resources in order to protect them from adverse negative impacts. Buffer zones associated with water resources have been shown to perform a wide range of functions and have therefore been adopted as a standard measure to protect water resources and associated biodiversity.

An aquatic impact buffer zone is defined as a zone of vegetated land designed and managed so that sediment and pollutant transport carried from source areas via diffuse surface runoff is reduced to acceptable levels (Macfarlane and Bredin 2016). When mapping a buffer zone, note that the buffer is only applicable to the land use / activity being assessed. The recommended buffer zones within this report are based upon prospecting activities only, not mining.

A final composite map showing rivers or dams are within 32m, 500 for wetlands of the proposed area and biodiversity of ecological sensitivity.

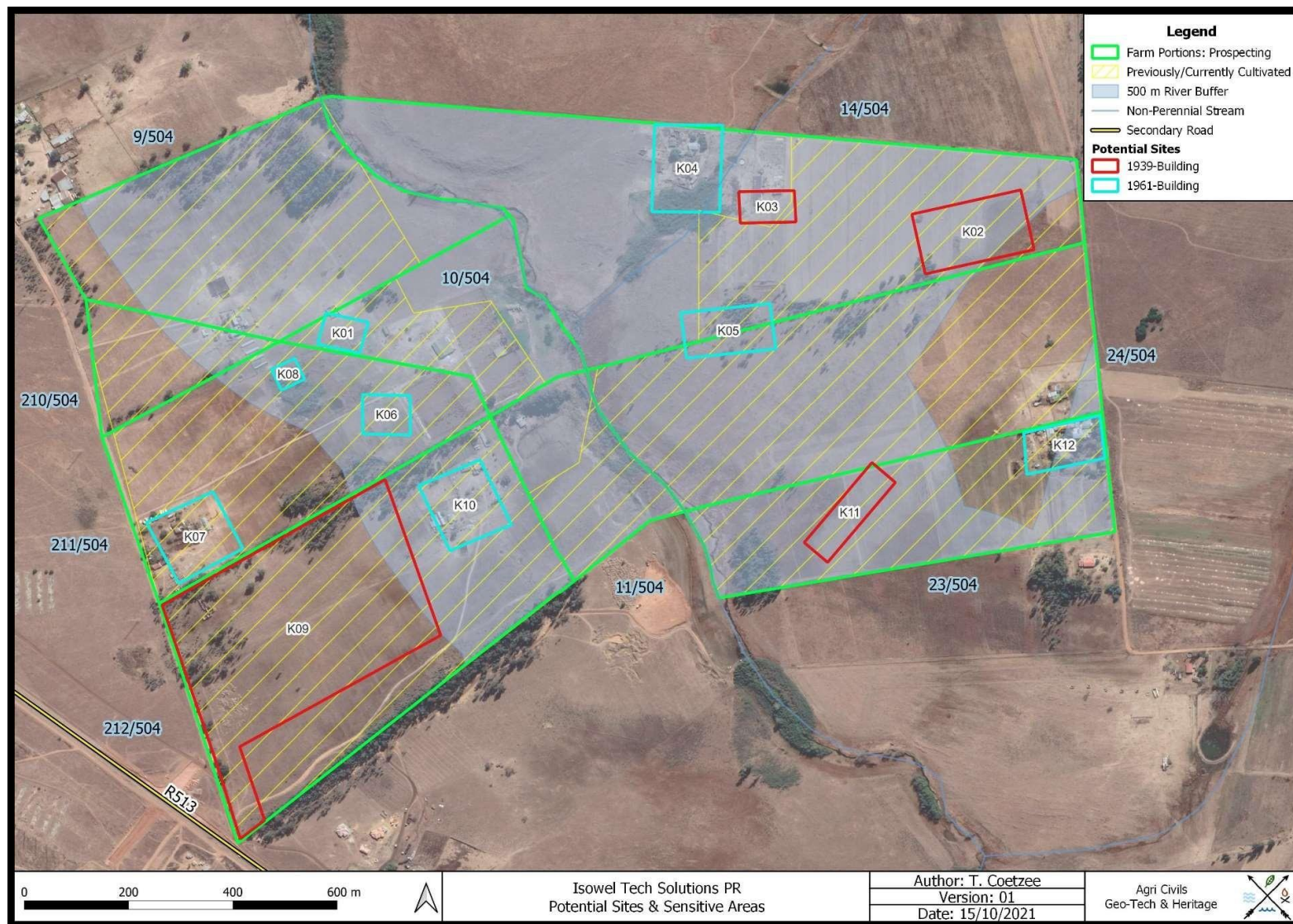


Figure 40: Composite Map





Figure 41: Gauteng C-Plan Map.

#### **6.4 Description of Impact management objectives including management statements**

**Determination of closure objectives.** (Ensure that the closure objectives are informed by the type of environment described)

##### **Decommissioning and Closure Phase Activities**

In broad terms decommissioning activities associated with the proposed site includes the removal of infrastructure, rehabilitation, preparation of final land forms for closure and prompting vegetation growth in order to reduce the effects of soil erosion and to re-establish landscape functionality.

After decommissioning, closure activities will include maintenance and aftercare that is required to ensure that rehabilitation is successful. In this regard, although closure objectives have not been finalised, one of the options that will be considered is rehabilitation to grazing potential land.

The project plan includes intensive concurrent rehabilitation in conjunction with prospecting activities to ensure a minimum time period is required for final rehabilitation and aftercare once drilling has halted.

##### **i) Volumes and rate of water use required for the operation.**

Isowel Tech Solutions will source water from the local municipality for drilling and portable use. The quantities are approximated at 2000-3000 litres a month during active drilling.

##### **ii) Has a water use licence has been applied for?**

A water use licence is not required for this project

## 6.5 Impacts to be mitigated in their respective phases

### Measures to rehabilitate the environment affected by the undertaking of any listed activity

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE STANDARDS WITH	TIME PERIOD FOR IMPLEMENTATION
Movement of Prospecting vehicles	All Phases	Temporary tracks	Dust suppression •Speed limits • Service equipment regularly	NEMA Air Quality Act Mine Health & Safety Act	Concurrently with the Completion of prospecting activities in an area.
Maintenance of vehicles	All phases	200 cubic meters	Use oil trays	MPRDA Reg 68 NEMA Waste Act	Concurrently with the completion of prospecting activities in an area.
Disposal of Waste	All phases	200 litre bins	Use waste Receptacles	NEMA Waste Act MPRDA Reg 68	Concurrently with the completion of prospecting activities in an area.
Preparation of vehicle maintenance concrete padding	Operational Phase	0.25 ha	Concurrent rehabilitation	MPRDA Regulations 61 & 62	Concurrently with the completion of prospecting activities in an area.
Drilling and sampling	Operational Phase	0.5 ha	Concurrent rehabilitation	Procedures for Managing Significant Impacts Related to Prospecting.	Concurrently with the completion of prospecting activities in an area.
De-establishment and removal of infrastructure/ rehabilitation	Decommissioning and Closure Phases	1 ha	Systematic rehabilitation	Procedure for Emergency Preparedness and Response Procedure	Concurrently with the completion of prospecting activities in an area.



## 6.6 Impact Management Outcomes

(A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph ());

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATIONTYPE E.g. <ul style="list-style-type: none"> <li>• Modify through alternative method.</li> <li>• Control through noise control</li> <li>• Control through management and monitoring</li> <li>• Remedy through rehabilitation.</li> </ul>	STANDARD TO BE ACHIEVED (Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.
Movement of Prospecting vehicles	Dust, Noise	Loss soil resources	Construction Phase	Dust suppression •Speed limits • Service equipment regularly	NEMA Air Quality Act Mine Health & Safety Act
Maintenance of vehicles	water contamination	Loss soil Resources	All phases	Use oil trays	MPRDA Reg 68 NEMA Waste Act
Disposal of Waste	dust, water contamination	Loss of Fauna and Flora	All phases	Use waste Receptacles	NEMA Waste Act MPRDA Reg 68
Preparation of vehicle maintenance concrete padding	noise, dust	Loss soil resources	Operational Phase	Concurrent rehabilitation	MPRDA Regulations 61 & 62
Drilling and sampling	Loss of flora and fauna, habitat, Dust, Noise, water contamination	Dust emissions. loss of flora and fauna, Loss of habitats Impacted drainage patterns	Operational Phase	Concurrent rehabilitation	Procedures for Managing Significant Impacts Related to Prospecting.
De-establishment and removal of infrastructure/rehabilitation	Noise, air pollution	None	Decommission and Closure Phases	Systematic rehabilitation	Procedure for Emergency Preparedness and Response Procedure

## 6.7 Impact Management Actions

ACTIVITY Whether listed or not listed.	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD IMPLEMENTATION	FOR COMPLIANCE WITH STANDARDS
Movement of Prospecting vehicles	Dust, Noise	Dust suppression •Speed limits • Service equipment regularly	Construction Phase	NEMA Air Quality Act Mine Health & Safety Act
Maintenance of vehicles	water contamination	Use oil trays	All phases	MPRDA Reg 68 NEMA Waste Act
Disposal of Waste	Dust, water contamination	Use waste Receptacles	All phases	NEMA Waste Act MPRDA Reg 68
Preparation of vehicle maintenance concrete padding	noise, dust	Concurrent rehabilitation	Operational Phase	MPRDA Regulations 61 & 62
Drilling and sampling	Flora and Fauna, soils, Dust, Noise, water contamination	Concurrent rehabilitation	Operational Phase	Procedures for Managing Significant Impacts Related to Prospecting.
De-establishment and removal of infrastructure/rehabilitation	Noise, air pollution	Systematic rehabilitation	Decommission and Closure Phases	Procedure for Emergency Preparedness and Response Procedure

## **6.8 Financial Provision**

### **(1) Determination of the amount of Financial Provision.**

**Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation.**

The rehabilitation plan has been developed specifically to meet the closure objectives for this project.

Final end land use: - Natural veldt, potentially sheep grazing and aloe farming

Environmental objectives:

- After direct placement of topsoil, the area will be profiled to a free-draining landform.
- The soils will be ripped, treated and re-vegetated using a natural grass / shrub / tree mixture.
- The rehabilitated areas will be monitored for declared weeds and invasive plants. This will be controlled and managed as per the normal procedure.
- Grazing of rehabilitated areas will be avoided for the first 3-5 years until the desired nutritional status and vegetation coverage has been achieved.
- With proper rehabilitation and fertilisation techniques, this can be reduced to a minimum to ensure that the rehabilitated area is sustainable and will not degrade further due to erosion.
- Allowance will be made for a maintenance period of one year following rehabilitation.

### **6.9 Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties.**

This Basic Assessment Report and Environmental Management Plan will be made available to each registered stakeholder for review and comment. All comments will be captured in the issues and response section and will be included into the final report.

### **6.10 Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main prospecting activities, including the anticipated prospecting area at the time of closure.**

Rehabilitation of Camp Site - upon completion of the entire prospecting phase.

Rehabilitation of drill sites - immediately after drill completion.

Rehabilitation of Access Roads - Once the use of specific roads cease and upon completion of the prospecting work on site

General surface rehabilitation - concurrent with prospecting activities

## **7 LEADING CLOSURE OBJECTIVES**

### **7.1 Leading Closure Objectives**

#### **7.1.1 Socio Economic**

##### ***Closure Management Objectives***

The retrenchment processes will be followed as per requirements of the applicable legal process.

##### ***Specific Performance Criteria***

- The rehabilitated prospecting environment shall be made safe and deemed safe;
- Where possible infrastructure will remain for social investment opportunities, this will be decided in conjunction with the Integrated Development Plan (IDP) of the area and the local authorities (i.e. municipality). The soils and land capability will be rehabilitated.
- The location and details of any buried hazards will be clearly defined and robust markers will be installed and maintained.
- All fences **IF ANY** erected around the prospecting area will be dismantled and either disposed of at a permitted disposal site or sold as scrap (provided these structures will no longer be required by the post-prospecting land owner). Fences erected to cordon-off dangerous excavations will remain in place and will be maintained as required.

##### ***Monitoring and Reporting***

- Commitments made by Isowel Tech Solutions to I&APs in the issues register will be followed up on a regular basis.
- PPP reports and meeting minutes will be made available to all who attended, and copies kept on site. This will include an issues and response register.
- The stakeholder engagement manager will be responsible for keeping all records and following up on commitments made to affected parties.

##### ***Action Required***

- Any commitments made to I&APs will be attended to the relevant I&AP satisfaction as agreed upon between the I&APs and Isowel Tech Solutions .

#### **7.1.2 Traffic and Safety**

##### ***Closure Management Objective***

- Ensure that all roads rehabilitated and or left behind is safe in good working condition, ensuring public safety and access to site and monitoring points.

## **Monitoring and reporting**

- The site manager will inspect the roads for degradation and spillages.
- Speed limits will be enforced on site where appropriate and feasible.
- All incidences and issues will be recorded, as will the actions taken to address issues and records of such actions kept on site.

## **Action required**

- Any degradation to roads will be repaired with consultation of the roads department.

### **7.1.3 Topography and erosion control**

#### **Closure Management Objectives**

- Former Digital Terrain Measurements (DTM) will be used to establish what contours were present prior to waste dump and these will be used to help shape the area according to the final topographical plan.
- The area will have contours constructed to prevent soil erosion.

#### **Specific Performance Criteria**

- Surface water bodies shall not be left in any prospecting voids unless the operations manager demonstrates there will be no significant environmental impact (such as salinization, reduction in water availability, toxicity, algal problems, attraction to pest species or a local safety hazard).
- All slopes which may incur erosion will be profiled in such a way that a preferential down drain can be installed.
- Rehabilitated profiles must ensure free drainage of water and should be contoured to fit in with the catchment dynamics.
- Erosion control measures such as contouring, and soil vegetated in rehabilitated areas should be implemented. On gentle slopes, water will be encouraged to flow off the rehabilitated surface as surface flow, as quickly as possible without causing erosion.
- Where areas of potential ponding is noted, is to be re-profiled to be free draining thereby minimising the potential for ponding.
- All other slopes will have contour drains installed to prevent erosion at intervals of no more than 5m vertical and have a slope of no steeper than 1:250.
- Batter board positions at 50m intervals will be set out with the desired slope; these batter boards are to ensure that rehabilitation is completed to within 10% of the final landform. Grid pegs will be set out using the detailed 10m grid in the final profiling to achieve compliance.

- On achieving the profile to within 10% of the final elevation, the fill areas can be pegged out with stakes and these cut off on the elevation of the final profile. The final fill material will be placed around these until the stakes are covered.

### ***Monitoring and Proposed Actions***

- During decommissioning, the environmental site manager together with the site manager will monitor construction activities at least weekly.
- After rehabilitation the site will be monitored for any pooling or erosion on site, especially after rainfall. This will be the responsibility of the environmental site manager.
- The area needs to be surveyed every two months to monitor differential settlement.
- The environmental site manager will ensure annual soil assessments be conducted by specialist pedologists after rehabilitation of the site.
- Monthly inspections will be conducted by the environmental site manager for any erosion which must be addressed immediately if observed.
- The environmental site manager will ensure monthly inspection of surrounding areas for soil compaction.
- Ensure surface water monitoring and action plans are implemented.
- Rehabilitated sites will be inspected for soil erosion on a monthly basis, together with the visual inspection regards to the vegetation cover abundance.
- The rehabilitated areas must be monitored for the type and depth of soil cover used.
- Monitoring of any ecologically sensitive species should they be observed on site will be done as and when required.
- The site will be monitored for alien invasive species at least every 6 months. This will, however, be dependent on the species of alien invasive species on site.
  - Floral surveys will be conducted on rehabilitated areas on an annual basis, together with the soil quality and depth monitoring.
  - All reports will be kept at the prospecting offices. All incidences and issues will be recorded, as will the actions taken to address issues. The environmental site manager will be responsible for inspection of sites and keeping records of all monitoring activities.
  - The site manager is responsible for ensuring that all vehicles, remaining on site during the decommission phase, are serviced on a regular basis in terms of the maintenance plans.

### **Action Required**

- Should it be noted that designs are not being followed, construction activities will cease and corrective measures will be taken to ensure design specifications are achieved. Specialists will be consulted if necessary.
- Any pooling will be addressed by filling depression and / or grading areas and re-vegetating such sites.



- Any erosion will also be addressed utilising contouring, if necessary or a specialist will be consulted if necessary. Any eroded soils will be lifted and returned to the affected area.
- Any deficiencies will be corrected by placing material in these areas as per the rehabilitation plan.
- Additional material or soil will be brought in if required.
- Where topographical areas are exceeded and create storm water drainage issues, excess material will be removed and area rehabilitated as per the rehabilitation plan.
  - Any recommendations made by specialist pedologist after annual surveys of rehabilitated areas will be considered for implementation as proposed.
  - Any eroded soil will be lifted and replaced to the area which has been eroded.
  - The area will be rehabilitated as per the rehabilitation plan.
  - Erosion control measures, such as gabion structures, will be considered at areas where erosion is persistent.
  - Records of soil placement and package thickness will be kept on a monthly basis during the prospecting phase.
  - Where the soil depth is compromised the areas will be filled with topsoil.
  - Material will be brought in if necessary.
  - Any compacted soils will be ripped or diced and re-vegetated with indigenous flora. Vegetation will then be monitored in these areas.
  - Should any erosion be observed on site, it will be reported to the site manager and environmental site manager. The issue will be addressed, and consideration given to:
    - Increasing vegetative cover in problem areas through manual seeding/planting.
    - Consulting specialists.
      - Should soil depth be inadequate in the rehabilitated areas, then more soil will be brought in and deposited on the site.
      - The area will also be inspected for erosion to determine the reason for soil loss. This will be addressed immediately.
      - All recommendations made by the specialists will be implemented where deemed appropriate.
      - Manual seeding or planting should vegetative cover be inadequate.
      - An alien invasive management program will be implemented for the control and eradication of alien invasive species on site. This plan will give preference to mechanical control methods. Any chemicals utilised will be used responsibly. Where required DWS will be consulted with regards to the use of certain chemicals.

#### **7.1.4 Surface Water Control**

##### **Closure Management Objectives**

- Surface water will be managed as per GN704 and all clean water will be diverted around the rehabilitated area.
- All water that falls on the rehabilitated area will be managed in such a way that no erosion will occur through the use of contour drains.

- The filled and rehabilitated area will be shaped to facilitate run-off towards the catchment area.
- There shall be no long-term reduction in the availability of water to meet local environmental values.

### **Specific Performance Criteria**

- Actions shall be taken during rehabilitation to ensure that surface and groundwater hydrological patterns/flows will not be adversely affected by the rehabilitation.
- Surface and groundwater levels and quality will reflect original levels and water chemistry;
- Once the final re-profiling has been completed and the clean water diversions are constructed on the rehabilitated ground, the decant from these areas should be minimal and the in-pit water will reduce.
- Run-off from un-rehabilitated areas will be directed away from any rehabilitated areas. Runoff from rehabilitated areas will be channelled to sedimentation structures so that eroded soil does not leave the property.
- Natural drainage lines will be followed to reduce loss of water in the natural catchments.

### **Monitoring and Proposed Actions**

- The environmental site manager will ensure that surface water management is adhered to during the closure phase.
- The rehabilitated area will be monitored for ponding.
- Any areas where ponding occurs will be filled and reshaped as per the rehabilitation plan to ensure surface water runoff from the area and discourage ponding.

### **Water Quality Monitoring and Reporting**

- Bi Annual water testing will be implemented
- This monitoring program will include various upstream and downstream monitoring points and various sources on site.
- Database of results will be maintained by the environmental site manager and quarterly and annual reports will be compiled and submitted to the management and will be submitted to DWS.
- All samples will be submitted to an accredited laboratory for analysis.
- The following chemical parameters are recommended for the closure phase analysis:
  - ✓ Total Dissolved Solids;
  - ✓ Electrical Conductivity;
  - ✓ pH level;
  - ✓ Alkalinity;
  - ✓ Carbonates;
  - ✓ Magnesium;
  - ✓ Calcium;
  - ✓ Sodium;
  - ✓ Potassium;
  - ✓ Sulphate;
  - ✓ Chloride;
  - ✓ Fluoride;
  - ✓ Iron;
  - ✓ Manganese;

- ✓ Aluminum
- Water use and consumption on site must be monitored at various strategic locations on site.

### 7.1.5 Ecology

#### ***Closure Management Objectives***

- Areas will be fenced off once seeded to prevent surface disturbance to the site and allow for vegetation to establish and stabilise.

#### **Specific Performance criteria**

- Vegetation in rehabilitated areas will have equivalent values as surrounding natural ecosystems.
- The rehabilitated ecosystem will have equivalent functions and resilience as the target ecosystem.
- Soil properties will be appropriate to support the target ecosystem.
- The rehabilitated areas will provide appropriate habitat for fauna
- Fauna utilisation, abundance and diversity appropriate to specified post prospecting land use.

#### **Monitoring and Proposed Actions**

- Services of a qualified person will be used to monitor the re-vegetation of the rehabilitated areas,
- Records of the monitoring will be kept on site.
- The environmental site manager will ensure that an alien invasive monitoring, eradication and control programme is established during closure and the area will be inspected at least every 3 months and more frequently in areas where alien species were observed.
- The environmental site manager will be responsible for inspecting and managing any protected flora that may be identified by specialists. Specialists will be consulted regarding relocation of these species if necessary, during rehabilitation or closure.
- All incidences and issues during closure will be recorded, as will the actions taken to address issues. These will be filed and kept at the offices.
- Rehabilitation will be visually inspected at least monthly with regards to vegetation cover abundance.
- The rehabilitated area will be inspected monthly for general erosion and vegetative cover.
- Rehabilitated areas will be monitored for soil quality and depth annually.

#### ***Action Required***

- Should it be noted that designs are not being followed, rehabilitation activities will be amended to ensure corrective measures will be taken to ensure design specifications are achieved. Specialists will be consulted if necessary.
- The specialist's recommendations from bio-monitoring and from annual floral surveys of rehabilitated areas will be implemented as soon as possible.
- Should any erosion be observed on site, it will be reported to the site manager and environmental site manager. The issue will be addressed, and consideration given to:
  - Increasing vegetative cover in problem areas through manual seeding/planting.
  - Implementing erosion control measures should be implemented.
  - Consulting specialists.

- Should soil depth be inadequate in the rehabilitated areas, more soil will be brought in and deposited on the site.
- The area will also be inspected for erosion to determine the reason for soil loss.
- All recommendations made by the specialists will be followed.
- Manual seeding or planting should vegetative cover be inadequate.
- An alien invasive management programme will be implemented for the control and eradication of alien invasive species on site. This plan will give preference to mechanical control methods. Any chemicals utilised must be used responsibly.
- Should it be noted that designs are not being followed, rehabilitation activities will cease, and corrective measures will be taken to ensure design specifications are achieved. Specialists will be consulted if necessary.

#### **7.1.6 Land use**

##### ***Closure Management objectives***

- To ensure that rehabilitation (physical and chemical) is done to such an extent that land use potential is regained.

##### ***Specific Performance Criteria***

- Soil samples will be taken from rehabilitated areas annually over the full period of closure to determine soil fertility, depth compaction, acidity and prospecting related pollution. This should be conducted by qualified specialist who will also recommend actions and remedial measures to correct any issues observed on site.
- Only after the levelled areas have been inspected and approved by the Site Manager will topsoil be placed to a depth of 0.5m (where possible the original topsoil types should be placed back into the area where it was found). The topsoil layer must be as even as possible, i.e. it must be smooth and the depth must remain consistent throughout.
- Once the topsoil has been replaced, vehicle movement will be restricted to prevent compaction of the topsoil. All runoff from freshly top soiled areas will be channelled to pollution control structures so that eroded soil does not leave the property.
- Rehabilitated areas will be vegetated within the same growing season (before or during the rainy season). A suitable seed bed will be prepared to enhance the penetration and absorption of water, thereby giving the seed the best possible chance to germinate. The seeding depth should be very shallow to provide better germination. For most grass species seeding depth is approximately 5- 15mm.
- Rehabilitated areas will be re-vegetated with local indigenous flora as far as possible.
- Once the seed mixture has been sown the land must be rolled using to ensure consolidation around the seeds and effective moisture retention. Access to seeded areas will be restricted to protect the newly established pasture.

##### ***Monitoring and Measurement***

- A detailed monitoring and reporting programme will be established and followed.
- Rehabilitated areas will be monitored for vegetation cover and alien invasive encroachment at least monthly by visual means.
- Areas of failed growth will be fertilised if necessary and re-seeded or planted with seedling plugs. All exotic and invasive vegetation should be removed.

#### **7.1.7 Ground water**

##### ***Closure Management Objective***

- Monitoring will continue to detect and report on changes in round water regime

##### **7.1.7.1 Groundwater Quality and Quantity Monitoring and Reporting**

**The monitoring can be done through monitoring of existing boreholes during the invasive prospecting phase**

- Up slope and down slope groundwater monitoring will be conducted on a bi annual basis during the closure phase;
- The environmental site manager will be responsible for the implementation and maintenance of the groundwater monitoring and results obtained.
- The groundwater quality and levels will be monitored on a bi annual basis.
- All monitoring boreholes must be demarcated and protected to prevent damage or tampering.
- All samples will be submitted to an accredited laboratory for analysis.
- The following chemical parameters are recommended for the analysis during the closure phase:

Total Dissolved Solids / Electrical Conductivity;

- ✓ pH level;
  - ✓ Alkalinity;
  - ✓ Carbonates;
  - ✓ Magnesium;
  - ✓ Calcium;
  - ✓ Sodium;
  - ✓ Potassium;
  - ✓ Sulphate;
  - ✓ Chloride;
  - ✓ Fluoride;
  - ✓ Iron;
  - ✓ Nitrate;
  - ✓ Manganese; and
  - ✓ Aluminium
- Water use and water consumption on site will be monitored at various strategic areas on site.

##### **General Monitoring and Reporting**

- The environmental site manager and site manager will ensure that all disturbed areas are free draining.
- The groundwater flow dynamics will be calibrated every two years with updated monitoring data. This will assist with management and long term risk prediction and management.

- The environmental site manager will be responsible for inspection of sites and keeping records of all monitoring activities.
- All incidences and issues will be recorded, as will the actions taken to address issues. These will be kept at the site offices.

#### **Action Required**

- Should significant changes in qualities or levels be observed then:
- All high risk facilities will be inspected to ensure no severe problems occur in these areas which have resulted in poor quality leachate.
- Any issues observed will be reported to the environmental site manager and respective site manager.
- A geo-hydrologist will be consulted with regards to any additional mitigation or management activities which can assist in resolving potential pollution, such as cut-off drains.
- Should substantial decreases in groundwater levels or quality be observed in boreholes utilised by surrounding community then the applicant will need to find solutions in conjunction with affected parties.
- Should spikes be observed in water consumption then these will be investigated immediately and sources identified.
- All leaks identified will be repaired.

#### **7.1.8 Air Quality and Noise**

##### **Closure Management Objectives**

Dust suppression should be undertaken at site especially during the dry season and during windy conditions.

##### **Monitoring and proposed actions**

- Dust suppression techniques and/or frequency will be altered as necessary should dust levels become excessive and exceed target values during rehabilitation.
- Air quality monitoring and reporting will be conducted according to the GNR 827 –Dust control regulations;
- The environmental site manager will be responsible for managing the air quality database and implementing actions, should target levels and frequencies be exceeded. PM10 and PM2.5 monitoring will be conducted if required as per the air quality act and also fall within the responsibility of the environmental site manager.
- Ambient noise will be monitored bi-annually on the prospecting boundary in at least four compass directions.
- Occupational noise will be monitored on a monthly basis as part of Safety, Health and Environment.
- The environmental site manager will be responsible for managing noise level database and implement actions should acceptable noise levels be exceeded.
- The site manager will be responsible for ensuring that all vehicles, including those of contractors, are maintained as per their maintenance plan.



- All incidences and issues will be recorded, as will the actions taken to address issues. These will be kept at the project offices.
- Specialists will be consulted where necessary.

#### **Action required**

- Should ambient dust levels exceed recommended standards and frequencies as per the Air Quality Act, then the management plan for dust will be re-evaluated and assessed to improve dust control on site. Actions could include:
  - Use of dust binding agents in areas of high dust generation.
  - Consideration of sprinkler systems in areas of high dust generation.
  - More frequent spraying.
- Should ambient noise levels exceed target levels:
  - Additional noise measurements will be taken at all sensitive receptors beyond the prospecting area boundary in question, initially those nearest to the area and working further away until levels are within acceptable levels.
  - Should levels at sensitive receptors still exceed target levels, and it is due to prospecting activities, then the noise management plan will be re-evaluated to reduce noise at these sensitive receptors to within acceptable limits.
  - Additional actions can include:
    - ✓ Utilisation of sound buffers or screens around noise sources.
    - ✓ Enclosing point sources in sound-proof enclosures if possible.
    - ✓ Utilising silencers on equipment.
    - ✓ Considering quieter equipment.

### **7.2 Domain Specific Closure Criteria**

- It is very likely that the new temporary tracks will remain on site. Any unnecessary new temporary tracks traversing the site area will be rehabilitated as part of the overall rehabilitation of the prospecting area.
- Any contaminated surface material will be removed and disposed of on the co-disposal dump. Waste material will be removed to specific registered waste sites which handle that specific waste.
- Roads and infrastructure areas will be ripped down to 1m, in order to break up the severe compaction before rehabilitation proceeds. Tillage to 30cm will be needed to break up clods. The area will be contoured and seeded with local, indigenous species as per the recommendation of a specialist. Slopes must be kept as shallow as possible to reduce wind friction. The soils placed on the rehabilitated ground must be slightly compacted and not exceed a slope of 18° to ensure suitable substrate for vegetation and to reduce risk of erosion.

### **7.3 Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.**

Due to the nature of the activities, the impacts will be limited and of short duration. The management plan is provided in such a manner as to ensure concurrent rehabilitation. The areas for prospecting purposes will be the main area experiencing impacts. In this event the activities will be temporary in nature, and a detailed management plan has been provided to address potential impacts associated with these activities. The closure plan will assist to achieve the following objectives:

- management accountability and ownership of closure activity;
- ensure that stakeholders' needs, concerns and aspirations are taken into account when considering closure;
- comply with relevant or applicable legislative requirements;
- ensure the health, safety and welfare of all humans and animals are safeguarded from hazards resulting from prospecting activities that have been terminated;
- limit or mitigate adverse environmental effects to an extent that it is acceptable by all parties;
- mitigate socio-economic impacts in relation to a particular area in which an operation is located following decommissioning and subsequent closure as far as reasonably possible; help protect indigenous values;
- provide a reasonable basis on which the financial consequences of closure can be estimated, recognised and managed so that rehabilitation and closure is efficiently and cost effectively;
- avoid or minimise costs and long term liabilities to the company and to the government and public;
- ensure land is rehabilitated to, as far as is practicable, its natural state, or to a predetermined and agreed standard or land use which conforms with the concept of sustainable development and;
- Ensure investment decisions include appropriate consideration of closure, including both quantitative and qualitative impacts of closure.

**7.3.1 Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline.**

Table 20: Financial Provision Calculation

CALCULATION OF THE QUANTUM (REAL RATES)							
No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	0	17,4	1	1	0
2 (A)	Demolition of steel buildings and structures	m2	0	238,71	1	1	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	351,79	1	1	0
3	Rehabilitation of access roads	m2	500	42,72	1	1	21360
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	414,61	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	226,15	1	1	0
5	Demolition of housing and/or administration facilities	m2	0	477,42	1	1	0
6	Opencast rehabilitation including final voids and ramps	ha	0	242984,15	1	1	0
7	Sealing of shafts adits and inclines	m3	0	128,15	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0	166847,44	1	1	0
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	207805,47	1	1	0
8 ( C )	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	603565,59	1	1	0
9	Rehabilitation of subsided areas	ha	0	139709,6	1	1	0
10	General surface rehabilitation	ha	0,5	132171,31	1	1	66085,655
11	River diversions	ha	0	132171,31	1	1	0
12	Fencing	m	0	150,77	1	1	0
13	Water management	ha	0	50255,25	1	1	0
14	2 to 3 years of maintenance and aftercare	ha	0,6	17589,34	1	1	10553,604
15 (A)	Specialist study	Sum	0	0	1	1	0
15 (B)	Specialist study	Sum	0	0	1	1	0
					Sub Total 1		97999,259
1	Preliminary and General		11759,91108		weighting factor 2		11759,91108
					1		
2	Contingencies		9799,9259				9799,9259
					Subtotal 2		119559,10
					VAT (15%)		17933,86
					Grand Total		137493

### 7.3.2 Confirm that the financial provision will be provided as determined.

The financial provision will be provided as determined in the form of a bank guarantee for rehabilitation purposes as required in terms of NEMA and MPRDA prior to the granting of the environmental authorisation.

### 7.3.3 Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including Monitoring of Impact Management Actions, Monitoring and reporting frequency, Responsible persons, Time period for implementing impact management actions, Mechanism for monitoring compliance

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities (For Monitoring Programmes)	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
Establishment / construction of camp site	Visual inspection of soil erosion and / or compaction	Dust suppression •Speed limits •Service equipment regularly	Site Manager	Once-off upfront consultation with affected parties. As required as grievances are received. 1. Consultation to be signed off by Environmental Management. 2. All grievances to be signed-off by Environmental Management
Food preparation	Visual inspection of soil erosion and / or compaction	Restrict open fires *Maintain firebreaks	Site Manager	Weekly and after rain events
Maintenance of vehicles	Visual inspection of soil erosion and / or compaction	•Use oil trays	Site Manager	Weekly and after rain events
Disposal of Waste	Visual inspection of soil erosion and / or compaction	Use waste receptacles	Site Manager	Weekly and after rain events
Preparation of vehicle maintenance concrete padding	Visual inspection of soil erosion and / or compaction	Concurrent rehabilitation	Site Manager	Weekly and after rain events
Drilling and pitting	Visual inspection of soil erosion and / or Compaction, dust	Concurrent rehabilitation	Site Manager	Weekly during the drilling and pitting program (prior and post drilling and pitting) 1. Consultation to be signed off by Environmental Management.

				2. All grievances to be signed-off by Environmental Management
De-establishment and removal of infrastructure/rehabilitation	Follow up inspections and monitoring of rehabilitation	Systematic rehabilitation	Site Manager	<p>Monthly for a period of 6 months after rehabilitation activities are concluded.</p> <ol style="list-style-type: none"> <li>1. Monthly monitoring reports to be signed-off by the Environmental Manager.</li> <li>2. Corrective action to be confirmed and signed-off by the Environmental Manager.</li> <li>3. Consolidated monthly monitoring reports (including the corrective action taken) to be submitted to the Department of Mineral Resources. Assessment report for site closure to be submitted to the Department of Mineral Resources for approval.</li> </ol>

#### **7.3.4 Indicate the frequency of the submission of the performance assessment/ environmental audit report.**

Internal Audits must be conducted annually, and external Performance assessments must be undertaken on the EMP every 2 years. These reports must also include the assessment of the financial provision. The reports should be submitted to the DMR.

#### **7.3.5 Environmental Awareness Plan**

An environmental awareness training manual will be developed for the prospecting project.

All employees must be provided with environmental awareness training to inform them of any environmental risks that may result from their work and of the manner in which the risks must be dealt with to avoid pollution or the degradation of the environment.

Employees should be provided with environmental awareness training before prospecting operations start. All new employees should be provided with environmental awareness training. Environmental awareness and training is an important aspect of the implementation of the EMP. The onus is on the different parties involved in the various stages of the life cycle of the project to be environmentally conscious. Hence, it is suggested that all members of the project team are familiar with the findings of the site-specific EA report and the EMP. For instance, the contractor is responsible for the lack of environmental knowledge of his/her crew members. The contractor could forward internal environmental awareness and training procedures to the project manager and environmental officer for comment prior to the commencement of the project. Likewise, the above is applicable to the programming, design, operations and maintenance, and decommissioning teams. Environmental awareness ensures that environmental accidents are minimized, and environmental compliance maximized.

All staff and contractors will be submitted to an annual training / awareness course as to inform the staff of any environmental risks which may result from their work and the manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment.

Section 39 (3) (c) requires that an applicant who prepares an Environmental Management Programme or Environmental Management Plan must “develop an environmental awareness plan describing the manner in which the applicant intends to inform his or her employees of any environmental risks which may result from the work and the manner in which the risks must be dealt with in order to avoid pollution and degradation of the environment”. Environmental Awareness is required not only for management and employees (as described in Section 39 (3) (c) but also for visitors to the site. the following strategies and plans will be put into place for each of the parties.

#### **Visitor Environmental Awareness**



Visitor/sub-contractor environmental awareness will be generated through the provision of a signboard describing very briefly the environmental considerations applicable to them. The signboard should contain the following information:

- Statement of the applicant's commitment to environmental principles;
- List of the "rules" to which the visitor must abide. This will include:
  - No littering. Dispose of all waste in the bins provided;
  - No fires;
  - Stay on demarcated roadways and paths only;
  - Kindly report any environmental infringements they may notice;
  - Check your vehicle/equipment for diesel/oil leaks.

### **Senior and Middle Management Environmental Awareness:**

Achieving environmental awareness at upper levels of management is slightly different from the process at the operational level. There is often a fair level of the general value of environmental awareness, but site-specific issues will most often need to be communicated. This will be achieved by:

- Management must make themselves fully familiar with the EMP;
- Ensuring that there is a spare copy of the approved EMP at his/her disposal; management is encouraged to make notes in the document regarding the difficulty / ease of implementing the environmental management measures. These notes should be sent to the consultants to assist in future revisions of the EMP;
- The manager must ensure that the operators perform regular monitoring of their workstations / areas.

During the management's execution of their activities/being at the site, the management must be constantly be aware of and observant of especially the following:

- Dust levels - movement outside of demarcated areas;
- Litter management - general housekeeping;
- Topsoil management - fuel/oil management/leaks/changes;
- Success of operational re-vegetation; and
- Alien vegetation.

### **Operator / Workforce Environmental Awareness:**

Achieving environmental awareness amongst the operators and labour is probably the most important because they are usually present at the place where most environmental transgressions take place or in fact cause them. It is the aim of increased environmental awareness to reduce any such environmental transgressions.

Increasing environmental awareness at these levels can be achieved through the following strategies:

- Induction environmental training must take place prior to any contract period.
- Training: Each and every employee (contractor or not) must go through an environmental training process where at least the following items are covered:
  - The oil/fuel management policy must be explained to the employees. The reason for the policy must also be explained (i.e. to not impact on groundwater, surface water, soil quality etc.);
  - The domestic and industrial waste management policy & method must also form part of the training;
  - The topsoil handling method and the reasons for preserving topsoil (i.e. post prospecting re vegetation, erosion prevention etc.);
  - Alien vegetation management: How to recognize and remove such species;
  - Protection of the natural veld by not driving/manoeuvring or walking through the demarcated protection areas. Reporting that demarcation posts/tape is broken or removed;
  - Emergency management procedures such as dealing with oil spills or fires must also be drilled; and
  - Such training will, in this case, be carried out by the site manager/resident engineer.

### **7.3.6 Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.**

Environmental awareness training will be provided as well as ongoing awareness through the use of relevant environmental topics included in daily toolbox talks.

#### Basic Environmental Awareness

Management is responsible to provide training of employees and contractors on:

The importance of conformance with the environmental management plan (EMP).

The significant environmental impacts, actual or potential, of their work activities and the environmental benefits of improved personal performance.

Their roles and responsibilities in achieving conformance with the EMP, including emergency preparedness and response requirements.

The potential consequences of departure from specified operating procedures.

#### Comprehension Training

Comprehension training must include:

Emergency preparedness and response

Spill management

Water management

Incident reporting

Storage of chemicals

Each supervisor is responsible to ensure the above are discussed with all employees and contractors, for which attendance must also be recorded. Records must be submitted to management.

#### Scheduling and conducting of training

After the training needs have been identified, it is the responsibility of Management or appointed representatives to ensure that personnel attend the relevant identified training. Progress on compliance with the training program must be verified during the Management meetings.

### **7.3.7 Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment.**

The role that the Environmental Awareness Plan plays in reducing the risk of pollution or degradation of the environment is best understood in its entirety. Isowel Tech Solutions will implement an environmental management system to assist in the implementing and monitoring of commitments included in this BAR and EMP report.

### **7.3.8 Specific required information and recommendations required by commenting Authority (Among others, confirm that the financial provision will be reviewed annually).**

#### **7.3.8.1 General**

There are several habitats within the proposed site that have been exposed to high levels of disturbance resulting from plantations, alien invasion and human settlements.

The following are recommended:

- Watercourses must be avoided at all times except when moving across the sites. This should be done on existing crossings.
- All temporary stockpile areas including litter and dumped material and rubble must be removed on completion of exploration.
- No painting or marking of vegetation shall be allowed. Marking shall be done by steel stakes with tags, if required.
- Only necessary damage must be caused: for example, unnecessary driving around in the site should not take place.

The impacts associated with the proposed prospecting activities are likely to be from Low to Very Low after implementation of mitigation measures. As a result, it is the opinion of the specialist that this proposed prospecting application be considered provided that the recommendations stipulated in this study are adhered to.

It should be noted that should the applicant reach the mining right stage, a full ecological, wetland and aquatic studies are recommended.

The following recommendations are made in order to avoid the destruction of heritage remains within the area demarcated for prospecting:

- Although the 7 demolished sites dating to 1939 and 1961 appear not to be associated with surface remains, subsurface culturally significant material might be present (Sites K01 – K03, K05, K06, K08, K11). Therefore, it is recommended that these areas be avoided by the proposed prospecting activities.
- The five sites associated with surface remains might date to 1939 and 1961 (K04, K07, K09, K10, K12). The possibility therefore exists that the associated buildings and structures exceed 60 years of age. It is therefore recommended that these areas be avoided by the proposed prospecting activities.
- The remaining buildings and infrastructure associated with the demarcated study area appear to be of contemporary origin and are therefore not regarded to be significant from a heritage perspective.
- The 500 m buffer zone surrounding the non-perennial stream is potentially sensitive from a heritage perspective. Care should be exercised when prospecting within this boundary.
- Except for the sites falling within the area associated with current/historical cultivation, this area is less sensitive from a heritage perspective. It is therefore recommended that this area be considered when deciding on prospecting locations.
- It should also be noted that the identified sites can only be rated once inspected.
- It is advised that a qualified archaeologist be contacted whenever uncertainty regarding potential heritage remains exists.
- Prospecting should not take place in the vicinity of stone cairns, potential burial sites, stone-walling, building ruins or any other heritage material or structures.
- Should the prospecting outcome result in further development or construction, a full Phase 1 Archaeological Impact Assessment must be conducted on the affected area if triggered. Also, a full Phase 1 AIA must be done should the cumulative impact of the proposed prospecting exceed 0.5 ha.
- Because archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the prospecting phase, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed, all activities must be suspended and the relevant heritage resources authority contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).
- From a heritage point of view, prospecting may proceed on the demarcated portions, subject to the abovementioned conditions and recommendations.

#### 7.4 UNDERTAKING

The EAP herewith confirms

- a) the correctness of the information provided in the reports ☒
- b) the inclusion of comments and inputs from stakeholders and I&APs ; ☒
- c) the inclusion of inputs and recommendations from the specialist reports where relevant; ☒ and
- d) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed; ☒

y. Gutierrez

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Signature of the environmental assessment practitioner:

Archean Resources (Pty) Ltd

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Name of company:

28 October 2021

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Date:

**-END-**